Debt flexibility[*]

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Abstract

How flexible are corporate loans after origination? Theory predicts coordination problems should make syndicated loans harder to modify than single-bank loans. We show the opposite. Using comprehensive regulatory data, we document that syndicated loans are modified frequently and respond to borrower distress, while single-lender loans are half as likely to be modified. This gap is not explained by covenants or performance pricing. Instead, syndicated loans are monitored more intensively. We show theoretically and empirically how fixed monitoring costs generate scale economies: larger loans justify continuous monitoring enabling flexible renegotiation, while smaller borrowers receive arm's-length contracts with limited scope for modifications.

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1 Introduction

Loan contracts are not static: their terms—interest rates, maturities, and exposures—often change after origination. Prior research has shown that such adjustments are common in the syndicated loan market, where amendments reflect both ex ante contractual provisions and ex post renegotiation (Roberts and Sufi, 2009; Roberts, 2015; Chodorow-Reich and Falato, 2022). Yet most small and medium-sized firms rely on single-lender bank loans, and we know little about whether these contracts are amended with the same frequency or flexibility. Theory offers conflicting predictions. Fewer creditors should make renegotiation easier (Bolton and Scharfstein, 1996). However, fixed costs of monitoring and contract adjustment may limit banks' willingness to modify smaller loans. Which force dominates in practice remains an open question. We show that fixed monitoring costs—not coordination frictions—are the primary driver of debt flexibility.

Flexibility in debt contracts matters for both firms and the broader economy. For borrowers, the ability to amend loan terms after origination can determine whether they survive adverse shocks or pursue new investment opportunities (Nini, Smith and Sufi, 2009, 2012). For the economy, small and medium-sized firms are central to employment and growth, and they depend heavily on bank credit (Nanda and Phillips, 2023).[1] If this lending is rigid, downturns may be amplified and recoveries may be slowed. Understanding how and when banks adjust contracts is therefore important not only for corporate finance but also for assessing the resilience of credit supply to small firms.

In this paper, we offer a unified perspective on debt flexibility by documenting how loan modification and renegotiation vary across a comprehensive cross-section of bank borrowers, including those without access to the syndicated market. Our analysis relies on the FR Y-14Q, a regulatory dataset covering the corporate loan portfolios of the largest U.S. banks. The dataset records the evolution of loan terms and amendments at a quarterly frequency, and, vitally, includes both syndicated and single-lender loans. This feature allows us to compare

[1] Recent survey evidence confirms the continued importance of banks in SME lending: in the 2024 Small Business Credit Survey, 78 percent of SMEs applying for credit submitted an application to a bank (Small Business Credit Survey, 2025).

flexibility across market segments within a single reporting framework, something that prior studies based on public filings or Dealscan data cannot do (Roberts and Sufi, 2009; Roberts, 2015; Lee, 2025). By extending the analysis beyond syndications, which have been the focus of nearly all existing work, we document how much flexibility banks actually provide to their smaller borrowers, and derive insights into the theoretical mechanisms at play.

We document three main empirical findings. First, loan modifications are common overall. In our sample, 42 percent of loans are modified at least once, and about a quarter experience two or more amendments. These figures confirm that loan term adjustments are not exceptional events but a routine feature of bank lending, consistent with prior evidence from syndicated contracts (Roberts and Sufi, 2009).

Second, syndicated and single-lender loans differ sharply in both the frequency and the type of amendments. More than half of syndicated loans are modified at least once, and 40 percent more than once. The corresponding shares for single-lender loans are 37 percent and 20 percent. Amendments to single-lender loans overwhelmingly consist of discrete maturity extensions, typically occurring close to scheduled expiration. Syndicated loans, by contrast, display interest rate adjustments throughout the contract life, suggesting more continuous flexibility. This is the reverse of what coordination-cost theories would predict, and it challenges the classic view that single-bank relationships deliver more discretion than dispersed syndicates.

Third, amendments respond to borrower financial health, but far more strongly in syndications. Using banks' internal ratings, we find that downgrades increase the probability of amendment among both groups of loans. The effect, however, is significantly larger for syndicated loans, and is concentrated in interest rate changes. This result points to greater discretion in the way syndicated lenders adjust contracts to deteriorating borrower conditions, while single-lender loans remain comparatively rigid.

What explains these differences? We first study the role of ex ante contractual design. In the syndicated subsample, merging with the Shared National Credit register shows that covenant violations are often followed by amendments, consistent with prior work (Nini, Smith and Sufi, 2009, 2012; Chodorow-Reich and Falato, 2022). However, most amendments occur without a recorded violation. Similarly, linking to performance pricing grids in Dealscan indicates that rate changes are not explained by these provisions. Ex ante contractual features therefore leave most of observed differences unaccounted for.

We then turn to monitoring. In our data, syndicated loans are subject to more frequent audits and borrower financial updates, which we interpret as proxies for monitoring intensity. We show that monitoring intensity is significantly stronger among syndicated loans than among single-lender loans, and that amendments are significantly more likely to follow monitoring events. These patterns suggest that ex post monitoring, rather than contractual triggers, underpins the greater flexibility of syndicated contracts.[2]

To interpret these facts, we build on the adverse selection framework of Bolton and Freixas (2006). In our model, borrowers differ in their private types that are not immediately observable to the lender. This creates ex ante adverse selection: without additional information, lenders must offer terms that pool heterogeneous borrowers. Monitoring provides a way to learn about borrower quality over time, but it comes at a fixed cost. We assume that lenders can offer two types of contracts: one with monitoring, which permits ex post adjustments to terms as new information arrives, and one without monitoring, which remains rigid. Because the cost of monitoring does not scale with loan size, larger borrowers — in practice, those served through syndications — are more likely to select into the monitored contract. This mechanism generates an upward-sloping relationship between loan size and the modification frequency: bigger loans justify the fixed cost of monitoring and thus display greater flexibility.

We take this prediction to the data by asking how the gap in modification rates between syndications and single-lender loans changes once loan size is accounted for. The results show that scale economies in monitoring explain about half of the observed difference. This points to monitoring costs as a central driver of flexibility. However, scale economies do not tell the whole story. First, creditor dispersion is negatively related to modification rates, as

[2]For evidence on monitoring in the syndicated market, see also Gustafson, Ivanov and Meisenzahl (2021).

Bolton and Scharfstein (1996) hypothesize, but the effect is too small to offset the role of fixed monitoring costs. Second, even among loans of similar size, to borrowers with similar characteristics, or even within the same borrower, we find substantial variation in flexibility. This indicates that other mechanisms — such as contractual design — remain relevant, even if they cannot by themselves explain the main patterns.

Taken together, our evidence challenges the view that small firms obtain meaningful flexibility from large-bank lending relationships. Classic theories of relationship lending emphasize that banks can use private information and repeated interaction to adapt contracts to borrower needs (Diamond, 1984, 1991; Berger and Udell, 1995; Boot and Thakor, 2000). In practice, however, we find the opposite in the large-bank SME market: single-lender loans are rarely amended, and when they are, changes are narrow and delayed. Syndicated loans, by contrast, display continuous flexibility through interest rate adjustments and other discretionary modifications that track borrower health. This evidence helps reconcile theory with recent concerns about the limits of large-bank lending to small firms (Cole, Goldberg and White, 2004; Berger et al., 2005; Chen, Hanson and Stein, 2017). Our analysis points to fixed monitoring costs as the key mechanism: large banks incur these costs for syndicated borrowers, but not for smaller, single-lender relationships. The implication is that many small firms remain locked into rigid financial arrangements that limit their ability to weather shocks or invest in growth. By documenting these patterns systematically and linking them to monitoring intensity, we provide new evidence on the conditions under which relationship lending generates flexibility in practice.

Relation to the literature Our paper contributes to three strands of literature.

First, a large theoretical literature studies debt renegotiation and its implications for ex-ante incentives (Berlin and Mester, 1992; Bolton and Scharfstein, 1996; Diamond and Rajan, 2001; Garleanu and Zwiebel, 2009), while empirical evidence has focused on bonds (Asquith, Gertner and Scharfstein, 1994) or syndicated loans (Roberts and Sufi, 2009). Closest to our paper are Roberts (2015) and Lee (2025), who trace amendments in syndicated filings. We extend this evidence to single-lender loans across a wide cross-section of borrowers. While the syndicated market is of enormous importance (Chodorow-Reich and Falato, 2022), our results show they offer more — not less — flexibility than single-lender loans, challenging the assumption that creditor dispersion impedes renegotiation. Modifications also frequently occur outside financial distress, consistent with theories highlighting outside borrowing options rather than bankruptcy as key drivers of loan renegotiation.

Second, we add to the literature on covenants, which shows that violations are frequent and trigger adjustments in loan terms (Smith Jr and Warner, 1979; Beneish and Press, 1993; Chava and Roberts, 2008; Nini, Smith and Sufi, 2009, 2012; Murfin, 2012; Bradley and Roberts, 2015; Chodorow-Reich and Falato, 2022).[3] Our contribution is to show that for syndications, modifications outside covenant violations are more common than the violations themselves and of comparable magnitude. Moreover, we argue that fixed monitoring costs, not just covenant triggers, shape the renegotiation, and show that these costs can explain a substantial portion the large modification rate observed in the syndicated market relative to the single-lender segment.

Finally, we contribute to the literature on relationship lending as a source of small-firm flexibility (Leland and Pyle, 1977; Diamond, 1984, 1991; Boot, Greenbaum and Thakor, 1993; Berger and Udell, 1995, 1998; Boot and Thakor, 2000; Berger and Udell, 2002, 2006; Bolton et al., 2016; Papoutsi, 2021; Faria-e Castro, Paul and Sánchez, 2024). Classic work emphasizes that banks adapt terms through private information and repeated interactions, yet evidence shows large-bank lending is more transactional and less adaptable (Cole, Goldberg and White, 2004; Berger et al., 2005), with recent declines reducing SME credit and local employment (Chen, Hanson and Stein, 2017).[4] By documenting how large banks actually amend contracts, we show that their SME relationships offer far less flexibility than theory often presumes.

[3] We also connect to the literature on performance pricing (Asquith, Beatty and Weber, 2005; Ivashina, 2005). Our evidence suggests performance pricing does not account for higher modification rates of syndications.

[4] The Small Business Credit Survey (2025) reports that large banks were the most common source of applications (39%), ahead of small banks (29%) and online lenders (24%).

2 Data construction

Sources Our main source is the Federal Reserve's FR Y-14Q, which contains detailed quarterly data on the loan portfolios of banks. Since these data are collected primarily for stress-testing, only institutions with $100 billion or more in total consolidated assets are included. Thus our analysis speaks to lending by large banks.

We use Schedule H.1, which contains facility-level data on corporate loans and leases. The population is limited to loans with a committed balance higher than $1 million as of the reporting quarter.[5] Our basic unit of observation is a loan-quarter. We observe information on committed exposure, interest rate, collateral, maturity date, whether the credit agreement was renewed or restated in the preceding quarter, internal loan rating, as well as summary financial information on the borrower.[6]

We also use two additional data sources, which we merge with the FR Y-14Q: data on covenants and covenant violations of syndicated loans from the Shared National Credit (SNC) program; and data on syndicated loans from Reuters LPC's Dealscan. Information on these data sources and the merge procedure is reported in AppendicesA.1.2 and A.1.3.

Other data sources used to study how loans are modified after origination, particularly in the wake of covenant violations, include Dealscan (Roberts and Sufi, 2009), hand-collected data from SEC filings (Roberts, 2015), and the SNC data (Chodorow-Reich and Falato, 2022). Relative to these sources, the FR Y-14Q offers two main advantages for studying loan modifications: it covers a wider swath of the firm population and it allows researchers to track loan terms continuously after origination, making it straightforward to observe modifications over the life of the loan. One drawback of the FR Y-14Q is that it contains information only on the basic features of the contract, not on more complex features like covenants or performance pricing grids. Our merges with the SNC data and with Dealscan are meant to

[5] Reporting in Schedule H.1 is aggregated at the credit facility level, defined as a credit extension under a particular credit agreement. A credit facility may be drawn or undrawn, it may consist of a term loan or a credit line, it may be secured or unsecured, and so on. When the same facility provides for multiple extensions of credit (for instance, credit lines with different interest rates that may be drawn at different dates), these multiple extensions are aggregated. An obligor may have multiple facilities with the same bank.

[6] More details on variables in Schedule H.1 are provided in Appendix A.1.1.

provide information on these arrangements for the subsample of syndicated loans.[7]

Sample selection and loan classification Our loan-quarter-level dataset spans 2012:Q3 to 2023:Q3. We apply a number of selection criteria to the raw data. In particular, we drop loans to borrowers in the financial, real estate, construction, and utilities sectors; loans carried off-balance sheet by reporting banks; loans with gaps between the first and last observations; and loans with missing or difficult-to-interpret information on key loan terms.[8] The final sample contains 3.9m observations for 391k loans to 151k distinct borrowers. Appendix Table A-7 describes sample selection steps in detail and Appendix Table A-2 reports additional loan- and borrower-level summary statistics in the final sample.

In what follows, we contrast two groups of loans: single-lender (SL) loans, in which a single bank is providing credit to a borrower, and syndicated (SD) loans, in which a group of lenders, often including both banks and non-bank institutions, provide credit to a borrower under a common loan agreement. Schedule H.1 asks banks to report whether the loan is a participation in a syndicated facility, and we use this flag to partition loans into these two groups.[9] Because different tranches of the same syndicated facility (e.g., credit line and term loan) may have different contractual terms, we include tranches as separate observations in our sample.[10] We note that our data generally do not contain information on all tranches of a given syndication, since they may be held by institutions not subject to the FR Y-14Q reporting requirement. Appendix A.1.1.3 provides additional details.

Summary statistics Table 1 reports summary statistics on the loans at the time of their origination. As an initial insight, we note the importance of including SL loans, in that they account for about three-quarters of all loans and about one-third of total committed

[7] As discussed in Chodorow-Reich and Falato (2022), loans in this subset are accompanied by additional information on covenant compliance and bank responses to any violations.

[8] For instance, a loan for which information on maturity is always missing, or for which the origination date declines across two consecutive reporting periods.

[9] Specifically, we classify a loan as syndicated if the last observation of the FR Y-14Q variable `participationflag` is different from "No, not participated or syndicated". We exclude loans that never exit the syndication pipeline. Appendix A.1.1.3 provides more details.

[10] Our results are robust to including only tranches identified as held by the agent or lead bank.

exposure.

Table 1 shows four main differences between SL and SD loans. First, SL loans are smaller: the median SL loan has a committed exposure at origination approximately one-ninth of the median SD loan. Second, 40% of SL loans are fixed- or mixed-rate, whereas only 6% of SD loans are. Third, SL loans are more likely to be secured, although the majority (74%) of SD loans are backed by some collateral. Fourth, SL loans are less likely to be credit lines. Additionally, median maturity at origination is similar for SL and SD loans. However, this statistic masks substantial variation in maturity within loan type. The top panel of Appendix Figure A-3 shows that maturities of one year and more than five years are more common for SL loans. The bottom panel of Appendix Figure A-3 furthermore shows that one-year SL loans are mostly credit lines, which are uncommon among SD loans. Thus overall, SL and SD loan terms differ substantially. In the analysis, we take this heterogeneity into account by controlling for loan type (fixed rate, secured, credit line) and maturity at origination, and by reporting separate results focused on the subsample of term loans.[11]

3 Stylized facts on loan modifications

3.1 Defining loan modifications

We define a loan modification as a change in the loan's reported maturity date, the loan's interest rate, or both, from reporting quarter $t-1$ to quarter t.

Two things are worth noting about this definition. First, our sample contains floating-, fixed-, and mixed-rate loans. For fixed- and mixed-rate loans, we define an interest rate modification as a change in the overall reported interest rate. For floating rate loans, the interest rate spread is reported explicitly, and we define a change in interest rate as a change in the reported spread.[12] Second, our definition of loan modifications only involves two of

[11] Appendix Table A-2 reports summary statistics at the borrower level, and compares these summary statistics with their equivalent in Compustat data for the subsample of public borrowers in our dataset. Loans of public borrowers are, on average, more likely to be syndicated, credit lines, floating rate, unsecured, and have more favorable financing terms than loans of non-Compustat borrowers.

[12] In cases where the interest rate on a floating rate loan—the sum of the base and the spread—is subject to a

the four key loan terms that are observable in the data (interest rate, maturity, collateral, and commitment). This is because changes in commitment or collateral are rare and generally occur alongside changes in either interest rate or maturity, as we document below. Focusing on interest rate or maturity changes streamlines the discussion.

Our definition of loan modifications is based on changes in loan terms over the life of the loan. However, not all of these changes are necessarily associated with a major amendment to the existing credit agreement. Reporting banks flag major amendments by updating the initially reported origination date, acknowledging the substantive nature of the change. We refer to these events as re-originations and discuss their relationship to loan modifications in Section 4.1.3.[13]

3.2 Fact 1: the frequency of modifications

Our first set of findings, on the frequency of loan modifications, is reported in Panel A of Table 2. This table is constructed using the data collapsed to the loan level and reports the distribution of the number of modifications per loan.

There are two main points to note in Panel A of Table 2. First, unconditionally, 42% of loans experience a modification—a change in either maturity date or interest rate—over the life of the loan. The most common pattern is for the loan to be modified only once after origination.[14] Second, SD loans are approximately 50% more likely to be modified than SL loans, at 56% and 37%, respectively. Panel A of Table 2 also shows that the bulk of the difference is accounted for by SD loans that undergo several modifications: 19% of SD loans undergo four or more modifications, while only 9% of SL loans do. Finally, Panel A of Table 2 also shows that these differences are starker when comparing SD and SL loans within the subsample of term loans only. Thus, overall, modifications to key terms after origination

ceiling or floor, we do not count an adjustment of the spread in order to meet the floor as a modification.

[13] While approximately 80% of re-originations involve modifications in key loan terms, about 20% of them do not, so that re-originations are not an exact subset of loan modifications. This is why we analyze them separately.

[14] Note that given our definition, a loan modification could potentially reflect a simultaneous change in interest rate and maturity; we discuss the composition of modification by type of change below.

are very common. Moreover, relative to SL loans, SD loans are more likely to experience modifications – and repeated modifications – over the life of the loan.

Appendix Figure A-4 reports a time-series corresponding to Panel A of Table 2. Here, we use the full loan-quarter sample and compute the fraction of loans undergoing a modification in each reporting quarter. Consistent with Panel A of Table 2, in any given quarter, the fraction of SD loans undergoing a modification is substantially higher (about 20%, on average) than the fraction of SL loans undergoing a modification (about 10%, on average). [15]

As noted in Section 2, SD and SL loans differ in type (credit vs. term, fixed vs. floating rate, secured vs. unsecured), all of which are plausibly related to modification propensities. Additionally, borrower and lender characteristics may both influence modification propensities, and correlate with the propensity of a lender to participate in the syndicated market or the propensity of a borrower to seek syndicated loans. To address these potential confounders, Table 3 reports reduced-form results on the frequency of modifications by syndication status using data at the loan-quarter level. Specifically, this table reports OLS estimates of the following three models:

$$Y_{l,t} = \beta\, \mathbf{1}\left\{\text{Syndication}\right\}_l + \Gamma\, X_l + \Xi\, Z_{b(l),t} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t}. \tag{1}$$

Here, l indexes the loan, $b(l)$ the borrower, $k(l)$ the lender, and t the quarter. $s(b(l))$ denotes the sector of borrower $b(l)$. $Y_{l,t}$ is an indicator for whether a modification occurs in quarter t. X_l is a vector of loan controls, $Z_{b(l),t}$ is a vector of potentially time-varying borrower controls, and the α's refer to fixed effects. Standard errors are reported in parentheses and double-clustered by borrower and quarter.

The group of columns marked "Modification" in Table 3 reports the results. The first column in that group has no controls or fixed effects, and thus only measures the average

[15]These modification rates are stable over our sample period, except for a spike in SD-loan modification rates in 2020, followed by a slight upward trend thereafter. We discuss modification during and after COVID in Appendix A.3. While modification rates overall increased during COVID, we show that, consistent with the rest of our analysis in the paper, the increase was more marked for SD loans and generally took the form of interest rate changes. The higher modification rates among that group have persisted since then, possibly related to the transition from LIBOR to SOFR.

difference in modification rates between syndications and single-lender loans in the loan-quarter sample. In this specification, the mean modification rate is 13.1%, and it is 9.8p.p. higher for SD loans, consistent with the time-series of modification rates reported in Appendix Figure A-4. The second column is a specification containing lender-by-quarter and sector-by-quarter fixed effects; controls for loan type; and controls for borrower characteristics.[16] Thus this specification compares loans of similar characteristics (maturity, term vs. line, floating vs. fixed interest rate, security) made by the same bank to borrowers with similar financial characteristics in a given quarter. The difference in modification rates is about 8%, relative to an average modification rate of 14.9%.[17] The higher modification rate of SD loans is further confirmed by the third column in this group. In this specification, we replace the borrower controls and sector-by-quarter fixed effects with borrower-by-quarter fixed effects. We thus restrict the sample to borrowers that have at least one SD and one SL loan outstanding. In this case, the comparison is between two loans with similar characteristics issued by the same bank to the same borrower, one of which is an SD loan and the other is an SL loan. In that sample, the average modification rate is 17.3%; the incremental modification rate for SD loans is 5.7%, or about one-third higher than average. Thus, all three specifications are consistent with the simple averages reported in Panel A of Table 2 and support the finding that SD loans have higher modification rates than SL loans.

3.3 Fact 2: what happens during modifications?

Our second set of findings, on loan modification types, is reported in Panel B of Table 2. For clarity, we report only the type of the *first* modification over the life of the loan.

The first line in Panel B of Table 2 considers the pooled sample of SL and SD loans. Of the 42% of loans that are modified at least once in the pooled sample, 54% (or 23% of total loans) experience a change in spread, and 53% (or 22% of total loans) experience a change

[16] Table 3 reports details on loan- and firm-level controls. In particular, the loan controls include a set of maturity at origination fixed effects.

[17] The underlying sample changes from the first to the second column because of data availability with respect to borrower controls.

in maturity upon their first modification. Maturity modifications are predominantly extensions. By contrast, increases and decreases in interest rates are equally likely. Furthermore, after the first modification, only 10% of modified loans also experience a change in committed exposure, and only 5% also experience a change in collateral.[18] Finally, simultaneous modifications of both interest rate and maturity are rare, involving only 7% of modification cases. Thus, generally, modifications involve one loan term at a time – either maturity or interest rate.

The rest of Panel B of Table 2 compares the distribution of the modification types between SL and SD loans. Here a very sharp difference stands out: about three-quarters of SL-loan modifications are maturity extensions, whereas the share is about one-quarter for SD loans. On the contrary, about four-fifths of modifications of SD loans involve interest rate changes, while the number is about one-third for SL loans.[19]

The second and third groups of columns (marked "Maturity extension" and "Interest rate change") in Table 3 report reduced-form regression evidence consistent with this fact. We estimate the same three versions of the reduced-form model described in Equation (1), substituting an indicator for whether there is a maturity extension of an interest rate change in the current quarter as the dependent variable. Consistent with the results mentioned above, maturity extensions are significantly less likely for syndications (-2.6p.p. less, compared to an unconditional rate of 6.8%, in the second, cross-sectional specification, which contains loan and borrower controls but not borrower-by-quarter fixed effects). By contrast, interest rate modifications are much more likely for syndications (10.8p.p. more, compared to a 9.6% unconditional rate). Thus, even when comparing SL and SD loans of similar characteristics within the same bank, to borrowers with similar characteristics, the picture from the simple summary tables above remains: SD loan modifications tend to involve interest rate changes,

[18]Modifications to commitment or collateral are rare overall; when they do occur, generally coincide with a modification in interest rate or maturity. Only 17% and 20% of modifications to commitments or collateral, respectively, occur without an accompanying change in interest rates or maturity. Changes in other loan terms are, therefore, rare.

[19]Appendix A.4 discusses differences in the timing of modifications over the life of the loan, separating interest rate changes from maturity extensions. Appendix Figure A-5 shows non-parametric hazard rates of loan modifications by initial maturity. Interest rate changes are more frequent and steeper for SD loans, while maturity extensions mainly occur late in the life of SL loans, especially for longer maturities.

while SL loan modifications tend to involve maturity extensions. The tightest comparison possible in the data, between SD and SL loans issued to the same borrower, confirm this.

3.4 Fact 3: modifications and borrower financial health

We now study whether loan modifications are responsive to evolving borrower financial conditions and, if so, whether modification types differ between SD and SL loans.

For each loan, the FR Y-14Q requires banks to report internal risk rating measures. These are computed by banks and are primarily meant to measure distance to default. Banks also report a description of their rating system, which we use to harmonize the ratings into a single ten-point scale for all banks. Details of this procedure are reported in Appendix A.1.1.4. We consider two possible changes in this measure of financial health: a decrease in internal ratings (denoting a worsening in borrower financial health), if the borrower experiences a 1 unit or more reduction in rating on our harmonized rating scale; and an increase in internal rating, if it experiences a 1 unit or more increase. On average, in a given quarter, about 4.7% of loans experience a change (decrease or increase) in rating, with 1.7% experiencing a decrease.

Table 4 first reports OLS estimates of the following model:

$$\begin{aligned} Y_{l,t} \;=\; & \beta_1 D^{(-)}_{l,t} + \beta_2 \left(D^{(-)}_{l,t} \times \mathbf{1}\left\{\text{Syndication}\right\}_l \right) + \beta_3 D^{(+)}_{l,t} + \beta_4 \left(D^{(+)}_{l,t} \times \mathbf{1}\left\{\text{Syndication}\right\}_l \right) \\ & + \alpha_l + \Xi\, Z_{b(l),t} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t}. \end{aligned} \tag{2}$$

where $D^{(-)}_{l,t}$ is a dummy variable equal to one if and only if the loan experiences a reduction in internal rating from quarter $t-1$ to quarter t, $D^{(+)}_{l,t}$ is defined similarly but for an increase in internal rating, α_l is a loan-level fixed effect. Compared with specification (1), this specification includes loan fixed effects. It therefore compares modification propensities within the same loan over time, when internal loan ratings change relative to their average for the loan. The two specifications reported in the table include either borrower controls, or a borrower-by-quarter fixed effect. In Table 4, the dependent variables are either an indicator for whether loan l is modified in quarter t; an indicator for whether maturity is extended in quarter t; and an indicator for whether the interest rate on the loan changes. Additionally, in Table 5, we report results from the same specification as Equation (2), replacing the dependent variable with an indicator for interest rate increases and, separately, an indicator for interest rate decreases, in order to document the direction of change.

Starting with reductions in internal ratings, there are three findings. First, unconditionally, a decline in internal ratings is associated with an increase in the likelihood of modification. The effects are substantial: a deterioration in ratings increases the modification propensity by 6.0p.p., relative to a baseline rate of 14.9%. The effects on maturity extension are particularly strong; the increase is 5.1%p.p. relative to a baseline rate of 6.8%.

Second, SD loans are more likely to be modified than SL loans following a deterioration in internal ratings. This holds despite the fraction of SL and SD loans deteriorating in any given quarter being similar. The overall increase in modification propensity following a downgrade is 2.5p.p. higher for SD loans than for SL loans (or about one-third of the average effect of 6.0%). Moreover, for SD loans, modifications generally take the form of a change in interest rate: the last column shows that on average, a downgrade increases the propensity to adjust interest rates by 1.9p.p. relative to a baseline rate of 9.5%; for SD loans, this increase is 5.6p.p., or about three times the average effect. By contrast, the propensity to extend maturity increases significantly less for SD loans.[20]

Third, Table 5 shows that SD loans tend to experience increases in rates upon a downgrade, and reductions in rates following improvements in financial health. When internal ratings deteriorate, the probability of a rate adjustment to an SL loan barely changes, whereas for SD loans there is a statistically and economically significant effect. For SL loans, the increase in the likelihood of an interest rate increase or decrease following the downgrade is

[20] Appendix Table A-1 shows that these results are robust to changes in how downgrades are measured. In particular, the table defines a deterioration in rating in one of two ways: 1) a downgrade in the corresponding S&P rating (e.g., from AA- to A+, or A- to BBB, etc.), or 2) a downgrade in a coarser set of only three categories (investment-grade, non-investment-grade, junk). Quantitatively, the findings are very similar using the downgrade definition based on the 21 S&P rating categories. While the findings remain qualitatively very similar also for the second approach, some estimates are quantitatively different and are less precisely estimated.

quantitatively small (1.6%), whereas for SD loans, there is a statistically and economically significant likelihood of increase (5.4%). We return to this point in Section 4.1.2 when discussing performance pricing grids. Turning to improvements in ratings, Table 5 shows that interest rate reductions are substantially more likely for SD loans, mirroring the interest rate adjustment result following downgrades.

We note that results on the differential propensity to modify loans following ratings changes are generally weaker in the specification that includes borrower-by-quarter fixed effects (the second and fourth columns of estimates). These regressions restrict the sample to borrower-quarter pairs with both SD and SL loans outstanding. This result suggests that at least some of the differences in modification propensities stem from selection of borrowers into different loan contracts, as opposed to differences in the contractual designs of the two classes of loans. Nevertheless, the results remain significant even in these subsamples.

Overall, the results from specification (2) indicate that following a change in borrower financial conditions, loan terms — and particularly, interest rates — are more likely to be modified for borrowers with SD loans than for borrowers with SL loans. Notably, there appears to be more sensitivity of SD terms to the financial health of the borrower.

We conclude by noting that despite being positively associated with modification rates, changes in borrower financial health do not account for the bulk of loan modifications. Appendix Table A-9 shows that in the pooled loan-quarter sample, 13.2% of observations correspond to modifications. However, only 1.7% out of 13.2% have also undergone a loan downgrade in the prior quarter.[21] Thus the majority of modifications appear to take place for reasons other than financial distress.

3.5 Summary

The key stylized facts documented in this section are as follows.

1. Loan modifications are a frequent phenomenon: approximately 40% of all loans orig-

[21] Appendix A.5 discusses this evidence in more detail, and connects it to the notion of evergreening (Faria-e Castro, Paul and Sánchez, 2024).

inated in our sample are eventually modified, and approximately 15% of active loans are modified in any given quarter. However, modifications are substantially more likely for SD loans than for SL loans (56% vs. 37%).

2. For SD loans, the most prevalent modifications are interest rate changes, whereas for SL loans they are maturity extensions.

3. When borrower financial conditions change, the likelihood of loan modification increases, and more so for SD loans than for SL loans. Deteriorations in financial health generally lead to more interest rate modifications for SD loans and to a higher likelihood of maturity extension for SL loans.

4 Ex ante contractual design vs. ex post renegotiation

Why are syndicated loans more likely to be modified than single-lender loans? One possibility is that the difference reflects ex ante contractual design, for example through covenants or performance pricing. Another is that it reflects ex post renegotiation supported by lender monitoring. In this section we weigh these views. We conduct a simple test: if contractual design drives flexibility, we should observe it in covenants and performance pricing; if not, we should observe it in re-originations and, finally, in monitoring intensity.

Each subsection rules out one contractual explanation before turning to monitoring, which provides the only consistent account of the evidence. We show, first, that neither covenants nor performance pricing explain the higher modification rate of syndicated loans. We then turn to re-originations—events that, by definition, cannot be triggered by ex ante contractual provisions. Even there, syndicated loans are more likely to be modified. This points to flexibility arising from ad-hoc renegotiation rather than built-in contingencies, and motivates our final step: evidence on monitoring intensity.

4.1 Ex ante contractual design

4.1.1 Covenants

Data sources A large literature argues that credit agreements in the syndicated loan market contain a formal mechanism–covenants–often used to modify loan terms as borrowers' financial conditions change. A natural question arising from Section 3 is whether the higher modification rate among SD loans reflects their more frequent use of covenants.

Our primary data, the FR-Y14Q, do not contain covenant information. To address this issue, we merge the FR Y14-Q to the "covenant review sample" of the Shared National Credit (SNC) database.[22] Relative to the SD loan subsample of the FR Y14-Q, the merged subsample consists of loans that are larger on average, but otherwise have comparable maturities and spreads, and are equally likely to be secured and fixed-rate. Additionally, 76% of all FR Y-14Q loans that appear in the covenant review sample are modified at least once in the FR Y14-Q. This modification rate is higher than our baseline loan-level modification rate of 56% for SD loans overall in the FR Y14-Q sample.[23]

Findings Table 6, Panel A, shows that 82% of syndications that ever violate a covenant are modified at some point in the FR Y-14Q. This modification rate is higher than the baseline modification rate of 56% in the overall SD loan sample. Thus, perhaps unsurprisingly, covenant violations appear to be associated with higher modification rates than average. However, Panel A of Table 6 also shows that 64% of loans that are modified at some point after origination, and appear in the covenant review sample, are not in violation of a covenant as far as we can observe in the covenant review sample. Thus, while covenant violations are generally associated with modifications, modifications are a broader phenomenon, in that they happen even for syndications that do not violate covenants. Panel B confirms this fact

[22]See Chodorow-Reich and Falato (2022) for a detailed description of these data. Note that these data only cover loan syndications. Appendix A.1.2 reports more details on the merge and the measurement of covenants violations.

[23]Appendix Table A-3 reports summary statistics on the merge between the full SNC sample and the FR Y14-Q (top panel), and the SNC covenant review sample and the FR Y14-Q (bottom panel).

using the loan-quarter level data.[24] Finally, Table 6, Panel C, suggests that the magnitude of the modifications outside covenant violations are substantial and in the direction of relief. The average change in interest rate among syndications that never violated a covenant is -18 bps, a loosening of terms. This magnitude should be compared to the typical *increases* that occur in the current or following two quarters of a covenant violation, and that range from 17 to 43 bps, depending on whether the violation was respectively waived or enforced.

Taken together, these results show that while covenant breaches are often associated with modifications (consistent with the findings of Roberts and Sufi 2009), they cannot account for the higher modification rates of SD loans, prompting us to examine another contractual feature that could generate rate changes: performance pricing grids.

4.1.2 Performance pricing

Background Performance pricing (PP) refers to the practice of linking the loan spread(relative to the base rate) to a performance grid. This performance grid is typically expressed in terms of issuer ratings or financial ratios (debt-to-cash, leverage, interest coverage).[25] Ivashina (2005) shows that in the Dealscan sample, 22.7% of loans contain PP grids, 76.5% of which allow for interest rate decreases in case the performance metrics are achieved. Asquith, Beatty and Weber (2005) study PP in detail, and argue that PP grids are more likely to be implemented in syndications involving banks that have larger re-contracting costs.[26] The prevalence of PP clauses could plausibly contribute to the high frequency of interest rate changes among SD loans, both in absolute terms and, to the extent that PP grids are less common in SL loans, relative to SL loans.

[24] In Panel B of Table 6, we classify a syndication-quarter observation included in the covenant review subsample as being in violation if and only if a violation is reported in the 6 months prior to the quarterly reporting date in the FR Y-14Q. Relative to Panel A, Panel B speaks to whether immediately after a violation, loans tend to be modified. We find that is generally the case — 60% of syndications reporting a violation in the review sample are modified in the following six months. The converse is however not true. In the merged sample, the majority (1939/2872=67%) of syndication-quarter observations with modifications do *not* follow a covenant violation.

[25] A typical PP grid will specify the spread as a function of a financial ratio. For instance, the spread over LIBOR will be 50bps if the ratio of debt to EBITDA is less than 1, 65bps if it is between 1.00 and 1.75, etc.

[26] See also Adam and Streitz (2016), Ivanov, Santos and Vo (2016) and Kim and Sohn (2017) for examples of the effects of PP grids on loan and borrower outcomes.

Data sources In order to obtain information on PP clauses, we merge our primary data, the FR Y14-Q, with Dealscan.[27] There are no common identifiers between the FR Y-14 Q and Dealscan, so we use a merge based on borrower name, bank name, and weekly origination date, as described in Appendix A.1.3. For loans that are successfully merged, we create a variable recording whether the corresponding tranche in Dealscan contains a PP clause.[28] This variable is only recorded in Dealscan at the time of origination, so our analysis below assumes that whether a PP grid exists is a fixed loan characteristic.

Findings After the merge to Dealscan, loans in our primary data can be grouped into four mutually exclusive groups: single-lender (SL) loans; syndicated (SD) loans that did not merge to Dealscan; SD loans that did merge to Dealscan, but do not contain PP clauses in Dealscan; SD loans that did merge to Dealscan and contain a PP clause at origination.

Table 7 first focuses on modification rates within the latter three categories, which together account for all SD loans in our primary data. Panel A reports modification rates among loans that successfully merged to Dealscan. Among these loans, 33.6% had a PP clause. However, Panel A shows that, somewhat surprisingly, loans with PP are significantly *less* likely to experience an interest rate modification (51% vs. 39%). This is true even when one excludes loans that experience distress, which we define as loans that are eventually downgraded from investment grade to junk. Additionally, Panel B of Table 7 shows that modification rates among SD loans that did *not* merge to Dealscan do not appear to differ materially from those that did, but do not contain a PP clause. If PP were responsible for the high modification rates of SD loans, one might have expected the modification rate of merged loans without PP grids to be significantly lower than both the non-merged SD sample, and the merged SD sample with PP grids. Our results show the opposite pattern:

[27]Dealscan is a dataset containing information on syndicated loans drawn from a combination of sources, including public filings and regulatory reports, and loan documents and term sheets provided by arrangers and underwriters. See Schwert (2018) for a description of the Dealscan data.

[28]The relevant Dealscan variables are `performance_pricing`, `performance_pricing_grid` and `performance_pricing_remark`. "Loans" in the FR Y-14 Q correspond to tranches of syndications in Dealscan; thus our merge is between FR Y14-Q loans and Dealscan tranches.

modification rates in both groups are higher.[29]

Finally, Table 8 repeats the baseline analysis of Section 3, splitting syndications into three groups: SD loans that are successfully merged and have a PP grid; SD loans that are successfully merged and do not have a PP grid; and unmerged SD loans. The results show that SD loans without PP grids remain significantly *more* likely to be modified than SL loans. Moreover, the magnitudes of the differences in interest rate modification rates are similar when compared to our baseline results reported in Table 3. Overall, this evidence suggests PP grids do not account for the differences in modifications between SD and SL loans, or for the high rates of interest rate modifications among SD loans overall.

The evidence on performance pricing is thus also inconsistent with the idea that ex ante design explains the higher modification rates of SD loans. This leads us to consider a sharper test: re-originations, which by definition cannot be triggered by contractual provisions.

4.1.3 Re-originations: falsification test

We next examine *re-originations*, defined in the FR Y–14Q as instances where a major amendment to the credit agreement is executed and the origination date of the facility is reset.[30] Re-originations are useful to our argument because they cannot be triggered by ex ante contractual provisions: by definition, they involve scrapping the original contract and executing a new one. If the higher modification rate of SD loans reflected only contractual design, their re-origination rates should not be higher.

Appendix A.7 provides detail on our construction of re-origination dates. Appendix Table A-5 shows that re-originations are not rare, occurring at least once for about 8% of loans. They almost always coincide with substantive changes in loan terms: over 80% line up with a modification in the current or immediately prior quarter, most often a maturity

[29]The result that loans with PP grids experience lower rates of modification within the merged sample is nevertheless surprising. Appendix A.6 provides evidence consistent with the possibility that this difference is due to selection on unobservable borrower characteristics, using a regression with different levels of fixed effects, particularly borrower fixed effects.

[30]The FR Y–14Q also tracks *renewals*, cases where loan terms are revised without a change in origination date. Reporting guidelines are less clear for renewals, making them a noisier measure of flexibility. Appendix Table A-6 reports results on renewals separately.

extension. Table 9 reports results from specifications similar to (1), but where the dependent variable is an indicator for whether the loan is re-originated. It shows that re-originations are more common for SD loans. In our saturated specification with borrower-by-quarter fixed effects, SD loans are about 0.4 percentage points more likely to be re-originated than SL loans, relative to an average re-origination rate of 1.4%. Thus, even when we focus exclusively on revisions that, by construction, fall outside any built-in contractual trigger, SD loans remain more likely to be modified.

Taken together, the evidence on covenants, performance pricing, and re-originations indicate that contractual design is not the driver of higher SD loan modification rates. The natural next step is to look at monitoring, the key mechanism that can support ex post renegotiation.

4.2 Monitoring intensity

We now turn to monitoring. Loan modifications require lenders to gather and update borrower information, and we show that monitoring is more frequent for SD loans than for SL loans. To measure the frequency of information sharing, we use the dates for which borrower financials are reported and/or audited. Specifically, the FR Y14-Q includes a variable recording the date as of which the borrower's financials (reported by the FR Y14-Q banks about the borrower) were current. In addition, the banks also may report the date of the borrower's last audited financial statements. We refer to these as "financials date" and "last audit date".

Summary statistics Table 10 reports summary statistics on monitoring intensity by loan type. Panel A shows that about 93% $(= 24.6\%/(1.9\% + 24.6\%))$ of SD loans have at least one update of their financials during the life of the loan, while only about 81% of SL do. Likewise, 80% of SD loans are to borrowers that are audited at least once during the life of the loan, while only about 42% SL loans are to borrowers undergoing an audit while in sample. This suggests that more information is gathered on the borrowers with SD loans.

Panel B of Table 10 focuses on *rates* of financial information sharing. We calculate, for loan i and event $x \in \{\text{audit in last quarter, financials update since last quarter}\}$,

$$\rho_{x,i} \equiv \frac{\#\text{occurence of } x \text{ in loan } i}{\#\text{observations for loan i}}$$

Computed this way, the quarterly rate of audit is 29% for SD loans, while it is only 13% for SL loans. The rates are 46% and 32%, respectively, for updates of financials. Thus overall, monitoring intensity seems to be higher among SD loans than SL loans, consistent with the idea that modifications require monitoring, the cost of which does not scale with loan size. Panel B additionally shows that the differences in monitoring intensities are dampened or even reversed when the loan enters its last year. That is, Panel B shows that SL loans typically feature more financial updates in their last year than SD loans. This is consistent with the result reported in Appendix Figure A-5, which show that hazard rates of modification of SL loans increase rapidly toward the end of the life of the loan, and can (for maturity extensions) exceed those of SD loans.

Reduced-form evidence For monitoring intensity and syndication status, Table 11 reports estimates of the three following specifications:

$$Y_{l,t} = \beta \, \mathbf{1}\{\text{Syndication}\}_l + \varepsilon_{l,t} \tag{3}$$

$$Y_{l,t} = \beta \, \mathbf{1}\{\text{Syndication}\}_l + \Gamma \, X_l + \Xi \, Z_{b(l),t} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t} \tag{4}$$

$$Y_{l,t} = \beta \, \mathbf{1}\{\text{Syndication}\}_l + \Gamma \, X_l + \alpha_{b(l),t} + \alpha_{k(l),t} + \varepsilon_{l,t} \tag{5}$$

This is analogous to our baseline specification in Section (3): l indexes the loan, $b(l)$ the borrower, $k(l)$ the lender, and $s(b(l))$ refers to the sector of borrower $b(l)$, and t the quarter. $Y_{l,t}$ is an indicator for whether a financial update or an audit occurred in quarter t. X_l is a vector of controls for loan l, $Z_{b(l),t}$ are potentially time-varying borrower controls, and the α's refer to fixed effects. Standard errors are reported in parentheses and double-clustered by borrower and quarter. Table 11 contains details on the set of loan and borrower controls we use.

The results in Table 11 are consistent with the simple summary statistics of Table 10. Unconditionally (specification 3), financials of SD loans are more likely to be updated. Furthermore, this effect survives when comparing loans to similar borrowers from the same lender and after controlling for loan type (specification 4). Finally, financial updates remain more likely if the loan is an SD loan, even when comparing within the same borrower-quarter (specification 5).[31] Overall, SD loans appear markedly more likely to be monitored than SL loans, even controlling for other potential determinants of monitoring intensity.

Next, we assess whether monitoring intensity is related to modification. We first define the following variable:

$$M_{l,t}^{(h)} = \max_{j=0,\ldots,h} \mathbf{1}\left\{\text{Modification}\right\}_{l,t+j}, \tag{6}$$

where $\text{Modification}_{l,t}$ is defined as in Section 3. Thus this variable is equal 1 if and only if the loan is modified at least once in quarters t to $t+h$. We use $h = 2$ in the results reported below, allowing for a 3-quarter window during and after the financial update or the audit for the modification to occur. The loan-quarter sample is therefore restricted to loan-quarter observations (l, t) such that the same loan l is also observed in quarters $t-1, t+1, \ldots, t+h$. This restricts the sample relative to our baseline analysis in Table 3.

We then estimate the three following specifications:

$$M_{l,t}^{(h)} = \beta\, \mathbf{1}\left\{\text{Financials update}\right\}_{l,t} + \varepsilon_{l,t} \tag{7}$$

$$M_{l,t}^{(h)} = \beta\, \mathbf{1}\left\{\text{Financials update}\right\}_{l,t} + \Gamma\, X_l + \Xi\, Z_{b(l),t} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t} \tag{8}$$

$$M_{l,t}^{(h)} = \beta\, \mathbf{1}\left\{\text{Financials update}\right\}_{l,t} + \Gamma\, X_l + \alpha_{b(l),t} + \alpha_{k(l),t} + \varepsilon_{l,t} \tag{9}$$

Similar to our analysis of monitoring intensity, specification (7) is a simple comparison of means, documenting the average association between financials updating and modification rates. The specification (8) is a cross-sectional comparison of comparable loans and borrow-

[31] The effect is also present but statistically insignificant for audits, possibly indicating that these are more extensive events that result in information sharing across all lenders to a particular borrower in a given quarter.

ers from the same lender in a given quarter, and shows whether financials updating is associating with greater subsequent modification likelihood. Finally, specification (9) restricts the sample to loan-quarter observations for which the corresponding borrower has multiple loans outstanding.[32] We additionally include borrower-by-quarter fixed effects.[33] We then repeat the same analysis, replacing the independent variable $\mathbf{1}\{\text{Financials update}\}_{l,t}$ by $\mathbf{1}\{\text{Audit}\}_{l,t}$.

The results are reported in Table 12. In all specifications, monitoring intensity is positively related to subsequent loan modifications. The effect is statistically significant and economically large, when compared to the baseline modification rate, ranging from one-fifth to one-third of the overall modification rate. It is strongest for updates to borrower financials, which appear to be more likely to relate to loan modifications even across loans within a particular borrower-quarter (9).

Thus overall, this evidence points to SD loans being monitored more intensively than SL loans, consistent with the higher modification rates documented in Section 3. This higher intensity of monitoring is exactly what enables the higher modification rates we documented earlier.

5 The role of scale economies in monitoring

In the previous sections, we documented that loan modifications are substantially more likely for syndicated than for single-lender loans. We then showed that this difference is not explained by ex ante contractual design: neither covenants nor performance pricing clauses account for the higher modification rates of syndicated loans. Moreover, even when we restrict attention to re-originations (events which, by construction, cannot be triggered by contractual provisions), syndicated loans remain more likely to be modified. Finally, we

[32]This is different from our baseline sample, where we focused on borrowers with SD and SL loans outstanding. Here we do not condition on syndication status, so we do not need to restrict the sample in the same way.

[33]This specification is very tight, in the sense that it measures whether variation in financials updating *across loans to the same borrower* are associated with variation in modification rates in the corresponding loans.

showed that syndicated loans are monitored more intensively, as measured by the frequency of updates of borrower financials and audits.

These findings suggest that differences in loan flexibility are driven more by monitoring than by contractual design. In this section, we provide a simple model that formalizes this idea. The model emphasizes that monitoring entails a fixed cost (for example, in collecting and processing borrower information),so that the relative return to monitoring increases with loan size. This scale effect provides a natural explanation for why larger loans, and thus syndicated loans, are more likely to be modified. The model also clarifies how ex post renegotiation, supported by monitoring, can generate the size–flexibility gradient observed in the data.

5.1 A model of scale economies in monitoring

The theory starts from the premise that lenders cannot observe borrower quality ex ante, and must choose between two lending technologies. Under arm's-length lending, the lender does not learn borrower type even after default; under monitored lending, the lender incurs a fixed cost up front to observe type at default and renegotiate accordingly. Good borrowers are willing to bear this cost, especially for large loans, since monitoring relaxes adverse selection constraints. This leads to endogenous sorting: larger loans are more likely to be monitored and, when needed, modified ex post. The model provides a framework for thinking about how debt flexibility varies with loan size—not as a contractual feature but as an outcome of selection and information acquisition.

5.1.1 Borrowers and projects

Time is discrete; with three periods, $t = 0, 1, 2$. The rate of time preference of all agents is normalized to 0. Each borrower, indexed by j, has one investment project, characterized by three variables: $L_j \geq 0$, the amount of financing needed to start the project at time $t = 0$; the probability $p_j \in [0, 1]$ that the project succeeds at time $t = 1$; and the probability $q_j \in \{0, 1\}$ that the project succeeds at time $t = 2$ if it has not succeeded at time $t = 1$.

Both L_j and p_j are common information, observable by both the borrower and potential lenders. The probability q_j is private information to the borrower. A borrower for which $q_j = 0$ is referred to as a bad type, or type B, while a borrower for which $q_j = 1$ is referred to as a good type, or type G. This information asymmetry will induce adverse selection. For each observable type (L_j, p_j) of borrower size and safety, we assume that there is a continuum of mass 1 of borrowers seeking financing. Moreover, a fraction $\nu \in [0, 1]$ are good types; this fraction is common information, known to potential lenders.

The timing of project output is depicted in Figure 1. For both borrower types, if successful at $t = 1$, output is $v_H L_j$; in particular, it scales linearly with size L_j. If the project is not successful at $t = 1$, an option to liquidate it for a value equal to $v_L L_j$ is available to both borrower types, where $v_H > v_L$. Type G borrowers can also continue operating their project until date $t = 2$, when its payoff will be $v_H L_j$ with certainty; thus for these types of continuation is optimal. Type B can continue operating the project as well, but their projects fail with certainty at $t = 2$, and produce no output, so that for types B liquidation is optimal.[34]

5.1.2 Debt contracts

Borrowers enter period 0 with no net worth, and their outside option, no investment, yields them a value of 0. They must finance all of their project from a lender. We assume that lenders are perfectly competitive and break even in expectation when lending to each group of borrowers of observable types (p_j, L_j).

We focus on two types of debt contracts, described below. These two types of debt contracts have the following common features. First, we assume that debt contracts both involve a fixed promised repayment at time $t = 1$, and additionally, that they specify that, should the borrower fail to repay the promised amount at $t = 1$, control rights (specifically, the continuation decision) shift to the lender. We discuss the importance of this assumption (and others) in Section 5.1.3 below.

[34] The choice of zero output is a normalization; more generally, key predictions hold if the continuation value for type B is less than the liquidation value per unit of project size.

Second, the unit gross cost of funds of lenders is assumed to be $\rho > 1$, where:

$$v_H > \rho > v_L. \tag{10}$$

The assumption $v_H > \rho$ ensures that a simple debt contract in which the borrower is always liquidated at $t = 1$ is feasible (that is, involves a promised repayment per unit of funds lent that is less than v_H) for at least some types p_j, while the assumption $\rho > v_L$ implies that promised repayments in the simple debt contract are decreasing in p_j. We now describe the two types of debt contracts in more detail.

Arm's-length (A) contract The first form of financing available is a simple debt contract in which the lender does not observe further information about the borrower type at $t = 1$. In what follows we refer to this type of contract as "arm's-length" (or A-type) lending. Under this contract, if the borrower fails to repay at $t = 1$, the lender must make a continuation decision that is independent of the unobservable type of the borrower. We assume that:

$$\nu < \frac{v_L}{v_H}. \tag{11}$$

Under this assumption, a renegotiated payment $v_H L_j$ that would transfer all project value to the lender at time $t = 2$ if the project were to succeed would yield, in expectation, $\nu v_H L_j < v_L L_j$, where the right-hand side is the value that the lender can obtain by liquidating the project at time $t = 1$. Thus, under condition (11), adverse selection is sufficiently severe that renegotiation is never optimal. The firm, under an A-type loan, is always liquidated if it fails to repay at $t = 1$, regardless of unobservable type. Using the zero-profit condition of the lender, the resulting unit cost of debt under this type of contract is:

$$r_A(p_j) = \rho + \left(\frac{1}{p_j} - 1\right)(\rho - v_L). \tag{12}$$

The second term on the right-hand side is a default risk premium that the lender charges in order to compensate for liquidation losses at time $t = 1$. Note that the cost of debt is invariant in loan size, because both the cost of funds and the output of the project both scale linearly in size. This contract is only available for firms such that:

$$p_j \geq \underline{p}_A \equiv \frac{\rho - v_L}{v_H - v_L}; \tag{13}$$

otherwise the contract would violate the borrower participation constraint $r_A(p_j) \leq v_H$.

Monitored (M) contract In the second type of debt contract available, at $t = 1$, the lender observes perfectly whether the borrower is type G or type B. Thus, it can make a continuation decision that is conditional on type. However, in order to obtain the information about the borrower's type at $t = 1$, the lender must also incur an additional cost m at time $t = 0$, in order to make the loan. Crucially, and different from the cost of funds, this cost, which we denote by m, is fixed and does not scale with the size of the loan. This fixed-cost assumption provides an alternative to the coordination-cost view Bolton and Scharfstein (1996): even with many creditors, flexibility arises because monitoring costs can be spread across larger loans. Section 5.1.3 discusses this assumption in more detail.

Upon observing borrower type, if there has been no repayment, the lender can either liquidate the firm, or renegotiate the loan. Liquidation is optimal if the borrower is a B type. If the borrower is a G type, we assume that the lender and the borrower bargain over the surplus from continuation, with Nash bargaining weights $(\beta, 1-\beta)$, respectively. This yields payoffs at time 2 of $(v_L + \beta(v_H - v_L))\, L_j$ for the lender and $(1-\beta)(v_H - v_L)L_j$ for the borrower.[35] At time $t = 0$, the zero-profit condition of the lender is then:

$$\rho L_j + m = p_j r_M(p_j, L_j) + (1-p_j)\left((1-\nu)v_L L_j + \nu\left(v_L + \beta(v_H - v_L)\right)L_j\right), \tag{14}$$

where note that, on the left-hand side, the cost of obtaining information about the borrower

[35]Equivalently, the renegotiated repayment is $\tilde{r}_M = v_L + \beta(v_H - v_L)$ per unit of debt, independent of borrower size and safety.

at time $t = 1$, m, is fixed with respect to L_j. This yields the following unit cost of debt under this contract:

$$r_M(p_j, L_j) = \rho + \frac{m}{L_j} + \left(\frac{1}{p_j} - 1\right)\left(\rho + \frac{m}{L_j} - \{v_L + \nu\beta(v_H - v_L)\}\right) \tag{15}$$

Two differences with respect to Equation (12) are worth highlighting. First, the unit cost of lending is $\rho + \frac{m}{L_j}$; in particular, because of fixed monitoring costs, it decreases in loan size. Second, the default risk premium is attenuated, relative to the A-contract, as a result of the ability to monitor. The spread declines with respect to the lender's bargaining power, β, and with respect to the fraction of good types, ν.

Finally, the participation constraint $r_M(p_j, L_j) \leq v_H$ implies that M-contracts are only offered to observable types such that:

$$p_j \geq \underline{p}_M(L_j) \equiv \frac{\rho + \frac{m}{L_j} - (v_L + \nu\beta(v_H - v_L))}{(1 - \nu\beta)(v_H - v_L)}. \tag{16}$$

The right-hand side of this equation is decreasing in loan size. Thus, for a fixed risk type p_j, M contracts will only be available for sufficiently large loans; otherwise, the unit cost of monitoring is too large for lenders to be able to charge an incentive-compatible interest rate. Additionally, similar to A-contracts, for given loan size, only sufficiently safe borrowers will be offered an M-contract by lenders. In this sense, single-bank loans at large banks do not embody the discretion highlighted in relationship-lending theories Diamond (1984); Berger and Udell (1995). Instead, they operate as arm's-length contracts with little scope for ex post adjustment.

Lending at time $t = 0$ At time $t = 0$, borrowers must choose between the two type of contracts. Contracts must offer all borrowers at least their reservation value, which is normalized to 0. We consider only pooling equilibria, in which bad types imitate good types.[36]

[36] Heuristically, this can be modeled as a game in which good types move first, and bad types are forced to imitate in order to avoid a separating equilibrium, as in Bolton and Freixas (2006) and Bolton et al. (2016).

Lenders offer identical terms, for either type of contract, to all borrowers of a particular observable type (L_j, p_j), and borrowers choose the contract that maximizes their time 0 equity value. Because bad types pool with good types, in what follows we focus on the optimal capital structure choices and renegotiation outcomes for good types.

5.1.3 Discussion of key assumptions

Adverse selection The baseline model assumes adverse selection: borrowers privately know their probability of success at the time of contracting. Empirical evidence across credit markets shows that borrower risk is not fully observable to lenders at origination. Petersen and Rajan (1994) find that stronger bank–firm relationships are associated with better loan terms and greater credit access, consistent with lenders learning about borrower quality over time. Degryse and Ongena (2005) show that geographic proximity between borrower and lender improves loan pricing, suggesting that face-to-face contact facilitates the acquisition of soft information. Drexler and Schoar (2014) find that when a borrower's loan officer is reassigned, credit access deteriorates, implying that key information is held at the individual level and not easily transferrable within the bank. These findings support modeling borrowers as privately informed about their type at the time of contracting.

The role of this assumption in the model is primarily to generate scope for ex post renegotiation once new information about borrower quality becomes available to lenders. The central mechanism does not hinge on private information at origination per se, but on the fact that the information is not available to all parties at $t = 0$, and is not contractible ex ante. For instance, suppose the success probability q_j were unknown even to the borrower until time $t = 1$, at which point it is revealed to the borrower and, under an M-contract, to the lender. Because performance at $t = 1$ is informative about future repayment prospects, lenders would still retain incentives to renegotiate under M-contracts.

Monitoring costs A central assumption of the model is that the cost of learning about a borrower's type is fixed with respect to loan size, and that at least part of it must be incurred ex ante—before the borrower's performance can be observed. This assumption captures two distinct but complementary features of how real-world loan monitoring is organized.

First, effective monitoring requires early acquisition of borrower-specific, soft information. Banks typically incur fixed up-front costs to understand a firm's financials, operations, and industry context. These costs are largely invariant to loan size and are critical to interpreting subsequent performance signals. This idea is emphasized in Berger and Udell (1995), who show that relationship lending relies heavily on soft information built over time through repeated interactions.

Second, monitoring practices themselves must be designed before loan origination. Banks make early organizational decisions about how the borrower will be monitored—who will be responsible, what information will be collected, and how it will be escalated. These choices, which include assigning a dedicated loan officer versus a credit committee, shape the effectiveness of future oversight. Liberti and Mian (2008) document that these monitoring structures are established ex ante and persist throughout the life of the loan.

Together, these observations provide support for modeling the cost of learning as both fixed and partly front-loaded. This view is also consistent with the broader empirical literature on bank lending technologies, such as Stein (2002), which emphasizes the organizational underpinnings of soft-information acquisition and the limited scalability of these processes.

It is important to note that the assumption that the cost is paid ex ante creates a form of commitment on the part of the lender, specifically, the commitment to monitor at $t = 1$. The only substantial assumption here is that at least some part of the cost is paid ex ante; the main qualitative implications of the model would be unchanged if the borrower paid the remainder of the monitoring costs ex post. In Appendix A.8.2, we consider a version of the model where monitoring costs are fixed but the lender can choose whether to monitor conditional on the borrower failing to repay at $t = 1$. We show that while some of the predictions regarding selection change, the main implication of the model — the gradient between loan size and flexibility — survives.

Other assumptions The model makes two additional assumptions. First, renegotiation follows Nash bargaining between lender and borrower. This is not essential — similar results obtain under take-it-or-leave-it offers — but it captures the idea that firms may retain bargaining power through outside options or the value of the lending relationship. Second, upon default at time $t = 1$, control shifts to the lender, who decides whether to continue. If the borrower controlled continuation, low types could inefficiently stay in, preventing separation. Lender control ensures that continuation reflects information about type and preserves the option to renegotiate efficiently. In practice, lenders typically retain this control through enforcement rights tied to collateral and default clauses.

5.1.4 Equilibrium financing choices and key predictions

Equilibrium financing choices Figure 2 shows optimal financing choices of borrowers as a function of observable characteristics, loan size L_j and borrower safety p_j, highlighting how borrowers sort between A and M contracts on the basis of these observables.

In this figure, the grey shaded area shows the region of the state space in which borrowers cannot obtain funding using either type of contract.[37] Here, borrower risk is too high in order for the break-even default risk premium to be incentive-compatible for the borrower.

In the blue shaded area marked ①, the only form of financing available are A-contracts.[38] In this region, loan size is too small (given borrower risk) to make monitored lending feasible. Thus smaller and (given loan size) riskier borrowers must obtain finance from A-contracts, exposing themselves to higher adverse selection costs at time $t = 0$.

In the blue and green shaded areas marked ② and ③, borrowers have access to both types of loan contracts.[39] In this region, firms must choose between the two types of contracts.

[37] Formally, this region is defined as $\left\{(L_j, p_j) \text{ s.t. } p_j \leq \min\left(\underline{p}_A, \underline{p}_M(L_j)\right)\right\}$.

[38] Formally, this region is defined as $\left\{(L_j, p_j) \text{ s.t. } p_j \in \left[\underline{p}_A, \underline{p}_M(L_j)\right]\right\}$.

[39] To make the Figure easier to read, we have omitted a region in which firms only have access to M contracts, defined as $\left\{(L_j, p_j) \text{ s.t. } p_j \in \left[\underline{p}_M(L_j), \underline{p}_A\right]\right\}$. In this region, very low unit monitoring costs make M-contracts available to borrowers that would otherwise be too risky to be financed through A-lending contracts; that is, M-contracts "expand" credit supply by reducing adverse selection costs among the riskiest borrowers.

Borrower equity values per unit of loan under each contract are given by:

$$\begin{aligned}
\frac{V_A(L_j, p_j)}{L_j} &= v_H - \rho - \overbrace{(1-p_j)\,(v_H - v_L)}^{\text{Adverse selection costs}} \\
\frac{V_M(L_j, p_j)}{L_j} &= v_H - \rho - \underbrace{(1-\nu)\beta(1-p_j)\,(v_H - v_L)}_{\text{Adverse selection costs}} - \underbrace{\frac{m}{L_j}}_{\substack{\text{Monitoring}\\ \text{costs}}}
\end{aligned} \tag{17}$$

Both expressions are reported for type G borrowers. The first expression shows equity value under an A contract. The fundamental value of the project for type G borrowers, net of the cost of funds, is $v_H - \rho$. However, these borrowers also must pay an adverse selection penalty, the term $(1 - p_j)(v_H - v_L)$, that reflects inefficient liquidation of the project in the absence of informed renegotiation. This penalty is decreasing in borrower safety p_j and increases in the extent of deadweight losses in liquidation for good projects, $v_H - v_L$. The second shows equity value under an M contract. There are two differences. First, efficiency losses in the absence of informed renegotiation costs are scaled down by a factor $(1 - \nu)\beta$ relative to the A contract, reflecting how flexibility can mitigate ex ante costs due to adverse selection. Second, though, monitoring is associated with higher unit lending costs, which are passed on to borrowers by competitive lenders in the form of higher promised repayments at time $t = 1$ conditional on project success. On net, the relative value of using an M over and A contract is given by:

$$\Delta_{MA}(L_j, p_j) = \underbrace{\{1 - (1-\nu)\beta\}\,(1-p_j)(v_H - v_L)}_{\text{Reduction in adverse selection costs}} - \frac{m}{L_j} \tag{18}$$

The advantage of using the M contract is that it alleviates the adverse selection penalty; this is more valuable, the riskier the firm, so that for a given loan size, riskier firms are more likely to sort into M contracts. On the other hand, this comes at the expense of higher unit lending costs. These incremental unit lending costs scale down with loan size, so that for a given level of borrower risk, larger borrowers are more likely to opt for M-contracts. The threshold for choosing the A over the M contract, which separates regions ② and ③ in Figure

2, is given by:

$$\underline{p}_{MA}(L_j) = 1 - \frac{m}{L_j} \frac{1}{(1-(1-\nu)\beta)(v_H - v_L)} \tag{19}$$

This threshold increases with L_j: as loan size rises, a broader range of borrower types sort into M contracts.

The following proposition summarizes the selection of borrowers into lending contracts; the proof is provided in Appendix A.8.

Proposition 1 (Equilibrium sorting) *There exists two loan size thresholds, $\underline{L}_M$ and $\overline{L}_M$, reported in Appendix A.8 such that:*

1. *If $L_j \leq \underline{L}_M$, all lending is supported by A contracts;*
2. *If $L_j \in [\underline{L}_M, \overline{L}_M]$, lending is supported by M contracts only for intermediate levels of borrower risk $p_j \in \left[\underline{p}_M(L_j), \underline{p}_{MA}(L_j)\right]$;*
3. *If $L_j \geq \overline{L}_M$, all lending is supported by M contracts except for the safest borrowers, $p_j \geq \underline{p}_{MA}(L_j)$.*

Key predictions The model yields three qualitative predictions that will guide our empirical analysis in the following section.

Prediction 1: Flexibility reflects monitoring and renegotiation, not just ex ante contract design. Loan modification in the model is not a predetermined contractual option, but the result of informed renegotiation under incomplete contracts. The key mechanism is the arrival of non-contractible information about borrower quality, made possible by costly lender monitoring. Thus monitoring intensity, and ex post arrival of new borrower information, should be associated with greater loan modification rates.

Prediction 2: Modified loans receive both maturity extensions and interest rate adjustments. In the model, renegotiation of M-loans occurs following default but depends on borrower type. For good types, repayment is extended and restructured. For bad types, liquidation remains optimal. Because types are not observable ex ante, the lender's optimal contract must accommodate both upward and downward interest rate modifications, alongside maturity extensions. In particular, the renegotiated interest rate is lower than the contractual interest rate, if and only if,

$$\underline{p}(L_j) \leq p_j \leq \frac{\rho + \frac{m}{L_j} - (v_L + \nu\beta(v_H - v_L))}{(1-\nu)\beta(v_H - v_L)}. \tag{20}$$

Otherwise, the renegotiated interest rate is higher than the contractual interest rate. Thus, upon monitoring, type G borrowers are not necessarily able to obtain more advantageous lending terms; lenders might instead increase rates.

Prediction 3: Loan size and likelihood of modification are positively related. Proposition 1 highlights that borrowers seeking larger loans are more likely to sort into M-contracts, as unit monitoring costs decline in size. As a result, loan modification rates increase with loan size. This size-flexibility gradient is illustrated in Figure 2, Panel B. This figure reports the ex ante probability that a loan of size $L_j = L$ will be modified ex post, as a function of loan size L.[40] Below the threshold $\underline{L}_M$, loans are never modified; for loans of intermediate size, modification rates increase sharply with respect to size; and finally, for the largest loans, modification rates are a relatively flat function of loan size, as most lending takes is supported by M contracts for very large loans.

We have shown in Section 3 and 4 that the data are consistent with predictions 1 and 2. The third prediction runs opposite to coordination-friction models, which imply that larger, more dispersed loans should be harder to adjust. We now test this prediction in the data, comparing modification rates in syndicated and single-lender loans while accounting for the role of size explicitly.

5.2 Syndication status, flexibility and size in the data

Section 4 has already provided evidence consistent with prediction 1: within SD loans, differences in ex ante contractual design does not appear to account for the bulk of difference in modification rates; moreover, ex post monitoring intensity is higher for SD loans, which

[40] This figure integrates across risk types p_j, assuming a uniform distribution of borrowers safety p_j on $[0, 1]$ for each loan size L_j.

are more likely to be modified. Furthermore, Section 3 showed that modified loans typically receive interest rate adjustment or maturity extensions, with the latter being more likely for SL loans and the former more likely for SD loans.

In what follows, we focus on Prediction 3, namely that loans with larger committed exposure are more likely to be issued under an M-contract, and therefore more likely to be modified. Our key question is: to what extent are differences in modification propensities between SD and SL loans driven by the fact that, because SD loans are large, borrowers are more likely to select into monitored contracts? Note that we do not argue that there is a direct mapping from SD loan to M-contract and from SL loan to A-contract. Rather, we take the view that syndications, because they are larger, are more likely to be supported by monitored contracts. The remainder of the section examines how far this view can account for flexibility differences across the SD and SL market segment.

Average modification rates by size Figure 3 reports a binned scatterplot of modification rates. The horizontal axis corresponds to deciles of the distribution of loans by committed exposure, and the vertical axis is the average modification rate in each decile. The modification rates reported are net of lender-time, sector-time, borrower, and maturity-at-origination fixed effects. Specifically, we first residualize modification rates by estimating the OLS regression:

$$Y_{l,t} = \alpha_{m(l)} + \alpha_{s(b(l)),t(l)} + \alpha_{k(l),t(l)} + \varepsilon_{l}, \tag{21}$$

where the notation is as in specification (1). We run this specification separately for SD and SL loans. We then construct Figure 3 by sorting loans l by deciles of size and plotting the decile-specific average of $\varepsilon_{l,t} + \mu_s$, where $s \in \{SD, SL\}$ and μ_s is the unconditional average modification rate for SD and SL loans, respectively.[41]

Figure 3 shows two main findings. First, within each group of loans (SD and SL loans), there is a clear positive relationship between size and modification rates, consistent with the model's prediction for the size-flexibility relationship. Second, though, the figure shows size

[41] Appendix A.9 provides more details.

does *not* entirely account for the difference in modification rates across the two loan groups as modification rates remain approximately 1.5$\times$ larger for SD than for SL loans, even for loans of comparable size.[42] Thus, while the relationship between modification rates and size is consistent with the economies of scale posited in the previous section, the interaction of (identical) fixed costs with differences in loan size cannot alone account for our finding of higher modification rates for SD loans.

Reduced-form evidence Sections 2 and 3 documented systematic differences between SD and SL loans in loan type (fixed vs. floating, term vs. line, secured vs. unsecured). Borrower characteristics beyond size may also contribute to differences in modification rates. To assess the role of size, we re-estimate the reduced-form specification of Equation (1) with an additional control for loan commitment at origination:

$$Y_{l,t} = \beta \mathbf{1}\left\{\text{Syndication}\right\}_l + \zeta \log(C_l) + \Gamma X_l + \Xi Z_{b(l),t} + \alpha_{s(b(l)),t} + \alpha_{k(l),t} + \varepsilon_{l,t}. \qquad (22)$$

Relative to Equation (1), the new term is $\log(C_l)$, the log of the loan's committed amount at origination. This specification is cross-sectional, comparing loans of the same lender, in the same quarter, to firms in the same sector. For reference, we also report estimates without the size control, which reproduce Table 3.

Table 13 shows two main results. First, loan size is positively and significantly associated with modification rates, especially for interest rate changes. This is consistent with Prediction 3 of the model: fixed monitoring costs lead larger borrowers to sort into contracts more likely to be modified ex post.[43] Second, once size is controlled for, the SD–SL gap in modification rates falls by about 35% (=1–5.1/7.8). This indicates that the greater flexibility of SD loans partly reflects the selection of larger borrowers into the syndicated market.

Two gaps remain. First, maturity extensions. While larger loans are more likely to be extended, SD loans are less likely to be extended than SL loans.[44] Controlling for size widens

[42] Appendix Figure A-6 reports the distribution of commitments at origination for the two types of loans.
[43] In the model, both increases and decreases in rates are possible, depending on ν.
[44] This is mainly driven by late extensions for SL loans; earlier extensions are less frequent.

the SD–SL gap, pointing to factors beyond fixed monitoring costs. Creditor dispersion is a plausible candidate, since extensions involve deeper changes than rate adjustments. Second, syndication retains explanatory power even after conditioning on size. This echoes the within-borrower results of Section 3. In the model, syndication should add little once size is absorbed. That it continues to matter suggests that economies of scale in monitoring are not the only source of greater flexibility in SD loans.

5.3 Creditor dispersion and coordination costs

A competing explanation for differences in flexibility is the creditor–coordination mechanism of Bolton and Scharfstein (1996). In their framework, having more creditors makes renegotiation harder, reducing the scope for modifications. Table 14 shows that this mechanism is present in our data. In this table, we estimate the same specification as in Equation (1), but add an indicator for whether the borrower has multiple ongoing banking relationships in our data, as a proxy for creditor dispersion. The results indicate that firms with a dispersed creditor base are less likely to be granted modifications, particularly maturity extensions, which plausibly involve more coordination across ongoing creditor relationships.[45]

However, the magnitude of this channel is limited. Quantitatively, the estimates of Table 14 indicate that having a dispersed creditor base only reduces the likelihood of loan modification by $0.8p.p.$ relative to a baseline modification rate of 13.2%. By contrast, recall that syndications are $8.6p.p.$ more likely to be modified than average, and that our proxy for monitoring-related scale effects, the log of total loan commitment, accounts for 35% of that effect. Dispersion effects are therefore present, but three to four times smaller in magnitude than the monitoring channel and the opposite sign.

Thus, while creditor dispersion helps explain why extensions are less common in SD loans, it cannot account for the overall higher modification rates of syndications. Economies of scale in monitoring appear to be the dominant force behind the patterns we document.

[45] The FR Y14-Q does not allow us to identify members of the syndicate, and hence to measure syndicate concentration directly. These results indicate that coordination frictions affect flexibility, though they need not arise within the syndicate itself.

6 Conclusion

This paper studies the flexibility of corporate loans after origination. Theory emphasizes that coordination problems should make syndicated loans harder to amend than loans between a single bank and its borrower. Using regulatory data covering both types of loans, we show the opposite. Syndicated loans are amended frequently and in response to borrower distress, while single-lender loans to small and medium-sized firms are only about half as likely to be modified, and primarily at maturity. This pattern runs directly counter to coordination-cost models, which predict the opposite ranking of flexibility.

Differences in ex ante contractual design—such as covenants or pricing grids—do not account for the gap. Instead, syndicated loans are monitored more intensively, and scale economies in monitoring make renegotiation efficient despite creditor dispersion. A simple model and supporting evidence show how fixed monitoring costs, rather than coordination frictions, go a long way toward determining which loans are flexible. In this sense, syndication delivers a form of relationship-style lending with continuous adjustment, while small-firm credit remains arm's-length and rigid.

The results speak to several strands of the literature. First, they extend the covenant-based evidence by documenting another channel through which corporate debt contracts adjust to borrower conditions. Second, they challenge the traditional view that single-bank relationships are the main source of ex post discretion. In our data, the opposite is true: flexibility is concentrated in the syndicated market. Finally, they show that the limits of debt renegotiation are shaped not only by contract design but also by the monitoring technologies available to lenders.

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	# Loans	# Borrowers	Amount ($mn)		Spread (bps)		Maturity (y)		% Fixed rate	% Secured	% Credit line
			mean	p50	mean	p50	mean	p50			
All loans	391k	152k	15.4	3.0	170	175	5.5	5.0	31%	86%	43%
Credit lines + term loans											
Single-lender (SL)	287k	143k	7.1	2.0	162	175	5.8	5.0	40%	90%	36%
Syndicated (SD)	103k	16k	38.4	17.4	189	175	4.6	5.0	6%	74%	59%
Agent	19k	8k	48.7	21.0	220	200	5.1	5.0	6%	78%	58%
Non-agent	84k	13k	36.0	16.6	182	162	4.5	5.0	6%	73%	59%
Term loans only											
Single-lender (SL)	183k	99k	5.5	2.0	189	195	6.9	5.0	56%	92%	
Syndicated (SD)	42k	10k	22.6	10.3	232	200	4.6	5.0	8%	79%	
Agent	8K	5K	30.9	14.0	265	236	5.4	5.0	5.7%	87%	
Non-agent	34K	8K	20.6	9.8	224	200	4.4	5.0	9.0%	77%	

Table 1: Summary statistics at origination. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. All loan terms are measured as of the first origination date of the loan. "Committed exposure" is the amount borrowed. "Spread" is the interest rate spread, expressed in basis points. If the loan is floating rate, we use the spread reported by the lender; if the loan is fixed rate we use the spread of the contractual interest rate over 3-month LIBOR or the Treasury yield that matches the remaining maturity of the loan. Maturity is the difference, expressed in years, between the origination date reported the first time the loan is observed, and the maturity date reported the first time the loan is observed. "Fixed rate" indicates whether the loan is fixed/mixed-rate or floating-rate. "Secured" indicates whether the loan is secured by a specific asset or group of assets. "Credit line" indicates whether the loan is flagged as a credit line in Schedule H.1. The panel marked "All loans" pools together all loans. The panel marked "Credit lines + term loans" provides summary statistics separately for single-lender (SL) and syndicated (SD) loans. The panel marked "Term loans only" provides the same breakdown, focusing only on term loans. The lines marked "Agent" and "Non-agent" split the syndicated loan sample between tranches held by the syndicate's agent, and those held by other banks. See Section 2 and Appendix A.1 for more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated.

Panel A. Modification frequencies	# Loans	**# Modifications**					
		0	1+	1	2	3	4+
All loans	391k	58%	42%	17 %	8%	5%	12%
Credit lines + term loans							
Single-lender (SL)	287k	63%	37%	16%	7%	4%	9%
Syndicated (SD)	103k	44%	56%	18%	12%	8%	19%
Term loans only							
Single-lender (SL)	183k	72%	28%	14%	6%	3%	5%
Syndicated (SD)	42k	46%	54%	19%	12%	8%	15%

Panel B. Modification types	# Loans	**% Modified**	**% With modification to:**			
			spread	maturity	amount	security
All loans	391k	42%	54%	53%	10%	5%
Credit lines + term loans						
Single-lender (SL)	287k	37%	39%	70%	11%	5%
Syndicated (SD)	103k	56%	82%	22%	9%	4%
Term loans only						
Single-lender (SL)	183k	28%	55%	58%	12%	4%
Syndicated (SD)	42k	54%	90%	14%	7%	4%

Table 2: Loan modification frequencies (Panel A) and types of modifications (Panel B). The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. In Panel A, a modification is defined as change in the interest rate (for fixed rate loans) or interest rate spread (for floating rate loans), or a change in maturity date, from the preceding quarter to the following quarter. Modifications are counted from the first time a loan is observed in sample to the time of its disposal. In Panel B, we consider only the distribution of modification types for the first time that the loan is modified. See Section 2 and Appendix A.1 for more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated. The columns in panel B can sum to values greater than 100 percent because modifications can occur simultaneously, i.e. an interest rate change and spread change occur in the same quarter.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$			$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$			$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	9.8	7.8	5.7	−3.6	−2.6	−2.2	13.5	10.8	8.2
	(0.23)	(0.22)	(0.36)	(0.10)	(0.13)	(0.18)	(0.23)	(0.20)	(0.35)
mean rate	13.1%	14.9%	17.3%	6.5%	6.8%	4.8%	8.0%	9.6%	14.0%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✗	✗	✓	✗	✗	✓	✗
loan controls	✗	✓	✓	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓	✗	✗	✓
bor. with SL & SD loans	✗	✗	✓	✗	✗	✓	✗	✗	✓
# obs	3927k	2572k	1052k	3927k	2572k	1052k	3927k	2572k	1052k
# loans	391k	288k	116k	391k	288k	116k	391k	288k	116k
# borrowers	155k	93k	7k	155k	93k	7k	155k	93k	7k

Table 3: Syndication status and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level. The specifications are summarized in Equation (1). The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first three columns, a modification is defined as either a maturity extension, or a modification of interest rates. For each of the three dependent variables, we consider a specification with no independent variables other than syndication status, a specification that includes lender-by-quarter fixed effects and controls for loan and borrower characteristics, and a specification restricted to firms that have at least one single-lender and one syndicated loan but that includes both lender- and borrower-by-quarter fixed effects. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed/mixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$		$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$		$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$	
$D^{(-)}_{l,t}$	6.0	3.3	5.1	2.5	1.9	1.8
	(0.24)	(0.51)	(0.21)	(0.33)	(0.14)	(0.43)
$D^{(-)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	2.5	1.2	−3.3	0.0	5.6	1.3
	(0.44)	(0.58)	(0.28)	(0.37)	(0.42)	(0.50)
$D^{(+)}_{l,t}$	7.4	4.3	6.7	3.0	2.0	2.0
	(0.32)	(0.60)	(0.31)	(0.34)	(0.16)	(0.54)
$D^{(+)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	0.1	0.8	−2.3	0.9	3.0	0.8
	(0.45)	(0.66)	(0.35)	(0.41)	(0.37)	(0.60)
mean rate	14.9%	17.2%	6.8%	4.8%	9.5%	13.8%
lender × quarter f.e.	✓	✓	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓	✓	✗
loan f.e.	✓	✓	✓	✓	✓	✓
borrower controls	✓	✗	✓	✗	✓	✗
borrower × quarter f.e.	✗	✓	✗	✓	✗	✓
borrowers w/ SL & SD loans	✗	✓	✗	✓	✗	✓
# obs	2467k	1003k	2467k	1003k	2467k	1003k
# loans	266k	109k	266k	109k	266k	109k
# borrowers	86k	7k	86k	7k	86k	7k

Table 4: Internal ratings changes and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (2). The variable $D^{(-)}_{l,t}$ is an indicator that is equal to 1 if the loan rating of the loan declines by at least 1 on a scale of 1 to 10 between quarters $t-1$ and t (ratings can change by more than 1). The variable $D^{(+)}_{l,t}$ is an indicator that is equal to 1 if the loan rating of the loan increases by at least 1 on a scale of 1 to 10 between quarters $t-1$ and t. The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first two columns, a modification is defined as either a maturity extension, or a change in interest rates. For each of the three outcome variables, we consider specifications with 1) borrower controls and 2) borrower-by-quarter fixed effects on the sample restricted to firms that have at least one single-lender and one syndicated loan. Section 2 and Appendix A.1 provide details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	$\mathbf{1}\{\text{Interest rate decrease}\}_{l,t}$		$\mathbf{1}\{\text{Interest rate increase}\}_{l,t}$	
$D^{(-)}_{l,t}$	0.3	1.1	1.6	0.6
	(0.10)	(0.27)	(0.14)	(0.38)
$D^{(-)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	-0.6	-0.5	6.2	1.8
	(0.25)	(0.32)	(0.45)	(0.46)
$D^{(+)}_{l,t}$	1.6	0.8	0.5	1.2
	(0.13)	(0.34)	(0.11)	(0.44)
$D^{(+)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	3.8	1.5	-0.8	-0.8
	(0.36)	(0.42)	(0.28)	(0.48)
mean rate	4.8%	7.0%	4.7%	6.9%
lender × quarter f.e.	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓
borrower controls	✓	✗	✓	✗
borrower × quarter f.e.	✗	✓	✗	✓
borrowers w/ SL & SD loans	✗	✓	✗	✓
# obs	2467k	1003k	2467k	1003k
# loans	266k	109k	266k	109k
# borrowers	86k	7k	86k	7k

Table 5: Internal ratings changes and interest rate changes. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (2). The variable $D^{(-)}_{l,t}$ is an indicator that is equal to 1 if the loan rating of the loan declines by at least 1 on a scale of 1 to 10 between quarters $t-1$ and t (ratings can change by more than 1). The variable $D^{(+)}_{l,t}$ is an indicator that is equal to 1 if the loan rating of the loan increases by at least 1 on a scale of 1 to 10 between quarters $t-1$ and t. The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first two columns, the outcome variable is an interest rate decrease. In the last two columns, the outcome variable is an interest rate increase. For each of the outcome variables, we consider specifications with 1) borrower controls and 2) borrower-by-quarter fixed effects on the sample restricted to firms that have at least one single-lender and one syndicated loan. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

Panel A: Syndication level	# loans	# modified	% modified
# loans with covenant violations	1656	1364	82%
# only waived	1303	1065	82%
# only enforced	115	93	81%
# both waived and enforced	238	206	87%
# loans with no covenant violations	3272	2389	73%
# total loans	4928	3753	76%

Panel B: Syndication-by-quarter level	# obs.	# modified	% modified
# obs. with covenant violations	1563	933	60%
# only waived	1292	787	61%
# only enforced	112	61	54%
# both waived and enforced	159	85	53%
# obs. with no covenant violations	4014	1939	48%
# total obs.	5577	2872	51%

Panel C: Interest rate changes	Δ IR, bps
Obs. with covenant violations	
only waived	17
only enforced	25
both waived and enforced	43
Obs. with no covenant violations	-18
# total obs.	744

Table 6: Modifications in the sample of syndications observed both in SNC and the FR Y14-Q. The FR Y-14Q sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the FR Y-14Q sample. Statistics are computed at the syndication level, which may correspond to multiple loans in the FR Y14-Q. Panel A treats each syndication as one observation. A modification is tabulated if any of the facilities or tranches has ever experienced a change in interest rate or maturity. "Only waived" is tabulated if at some point in the sample, the borrower would have breached a covenant absent a reset. "Only enforced" is tabulated if at some point in the sample, the borrower breached a covenant prior to reset. "Both waived and enforced" is tabulated if the borrower both breached a covenant and had a covenant reset during at some point in the sample. Never violated is tabulated if a borrower never breached nor reset a covenant. Panel B repeats the same tabulation, at the syndication-by-quarter level. The indicators for "waived", "enforced" and "both waived and enforced" are constructed by looking at the 6 months preceding the syndication-by-quarter observation. Given that the SNC sample is either twice yearly or yearly, it is possible for multiple covenant violations to occur in one reporting period. Panel C studies the same sample as Panel B, but reports information on the magnitude of interest changes for the subsample of syndication-by-quarter observations that experience an interest rate modification to one of their tranches. See Appendix A.1.2 for details on the merge between the FR Y14-Q and SNC.

	# loans	% loans with interest rate change	% loans with maturity extension
Panel A: Syndicated (SD) loans in Y14 ∩ Dealscan			
All loans			
No performance pricing clause	5284	51%	26%
Performance pricing clause	2674	39%	26%
t-test for diff. in means		(10.15)	(0.55)
Downgraded loans			
No performance pricing clause	545	76%	55%
Performance pricing clause	252	62%	52%
t-test for diff. in means		(4.07)	(1.01)
Non-downgraded loans			
No performance pricing clause	4739	48%	23%
Performance pricing clause	2422	37%	23%
t-test for diff. in means		(9.30)	(-0.08)
Panel B: All syndicated (SD) loans in Y14			
Not in Dealscan	95885	50%	22%
In Dealscan, no performance pricing clause	5284	51%	26%
t-test for diff. in means w.r.t. SD loans not in Dealscan		(-2.72)	(-7.03)
In Dealscan, performance pricing clause	2674	39%	26%
t-test for diff. in means w.r.t. SD loans not in Dealscan		(10.16)	(-4.44)

Table 7: Modification rates and performance pricing: comparison of simple means. This table focuses on syndicated (SD) loans only. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. Panel A reports a comparison of means within the sample of syndications that we can successfully identify in both the Y14 and Dealscan (there are 7958 such syndications). The first two lines compare the set of loans with a performance pricing clause reported in Dealscan, to those with no performance pricing clause. The next two lines focus on loans that are downgraded from investment grade to junk while in the Y14 sample, and performs the same comparison. The last two lines of Panel A perform the comparison in the group of loans that are not downgraded. In Panel B, the sample is the combination of all SD loans in the Y14, with the set of loans from Dealscan that are successfully merged to the Y14, and for which we can therefore ascertain the presence of performance pricing clauses. Panel B is meant to clarify that the group of Y14 SD loans that successfully merge to Dealscan do not have statistically distinct modification rates from those that do not merge. The column marked "% loans with interest rate changes" reports the fraction of all loans that undergo at least one change in interest rates, while the column marked "% loans with maturity extension" reports the fraction of all loans that undergo at least one maturity extension. Statistics reported in parentheses are t-statistics for differences in means across subsamples.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$			$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$			$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$		
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{no Dealscan merge}\end{array}\right\}_l$	9.9	8.0	5.3	−3.6	−2.6	−2.6	13.6	10.9	7.9
	(0.24)	(0.23)	(0.32)	(0.10)	(0.13)	(0.18)	(0.23)	(0.21)	(0.29)
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{Dealscan merge,}\\ \text{no performance pricing}\end{array}\right\}_l$	10.4	7.7	5.5	−3.7	−2.9	−2.8	14.3	11.0	8.4
	(0.37)	(0.31)	(0.37)	(0.15)	(0.17)	(0.21)	(0.37)	(0.29)	(0.34)
$\mathbf{1}\left\{\begin{array}{c}\text{Syndication,}\\ \text{Dealscan merge,}\\ \text{performance pricing}\end{array}\right\}_l$	4.6	4.9	3.5	−3.8	−2.7	−3.4	8.0	7.8	6.6
	(0.40)	(0.39)	(0.44)	(0.19)	(0.23)	(0.27)	(0.38)	(0.35)	(0.39)
mean rate	13.2%	14.9%	14.4%	6.5%	6.8%	5.2%	8.0%	9.6%	10.5%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✓	✓	✓	✓	✓	✓	✓
loan controls	✗	✓	✓	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓	✗	✗	✓
# obs	3927k	2572k	2210k	3927k	2572k	2210k	3927k	2572k	2210k
# loans	391k	288k	260k	391k	288k	260k	391k	288k	260k
# borrowers	155k	93k	47k	155k	93k	47k	155k	93k	47k

Table 8: Performance pricing and loan modifications: regression results. All specifications use data at the loan (l) by quarter (t) level. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. There are three dependent variables: loan l is modified in quarter t (either an interest change or a maturity extension); loan l has a maturity extension in quarter t; loan l has an interest rate change in quarter t. We classify loans in three groups: Y14 syndicated (SD) loans successfully merged to Dealscan and which have performance pricing grids in Dealscan (category 1); Y14 SD loans that are either successfully merged to Dealscan and do not have a performance pricing grid, or that are not successfully merged to Dealscan (category 2); and Y14 single-lender (SL) loans (category 3). The coefficients reported in the table are the loadings on a categorical variable for this classification, using SL loans (category 3) as the baseline category. The line "Syndication, no performance pricing" refers to loans in category 2, while the line "Syndication, performance pricing" refers to loans in category 3. For each dependent variable, we consider three specifications: a specification with no controls or fixed effects; a specification with lender-by-quarter and sector-by-quarter fixed effects, along with loan and borrower controls that include maturity at origination fixed effects; and a specification with borrow-by-quarter fixed effects. The standard error reported in parentheses are double-clustered by borrower and quarter.

	$\mathbf{1}\{\text{Re-origination}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	0.2	−0.1	0.4
	(0.06)	(0.06)	(0.11)
mean rate	1.4%	1.6%	1.4%
lender × quarter f.e.	✗	✓	✓
sector × quarter f.e.	✗	✓	✗
loan controls	✗	✓	✓
borrower controls	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓
borrowers with SL and SD loans	✗	✗	✓
# obs	2639k	1171k	662k
# loans	289k	167k	84k
# borrowers	120k	60k	5k

Table 9: Syndication status and loan re-originations. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3, but starts in 2014:Q4 because of the change in the definition of the re-origination variable. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1). The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. We consider specifications with no independent variables other than syndication status, a saturated specification, and one restricted to firms that have at least one single-lender and one syndicated loan. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated. Additionally, Appendix Table A-2 contains summary statistics for the regression sample.

Panel A.	% Single-lender (SL) loans	% Syndicated (SD) loans
No audit	42.9%	5.3%
Audit	30.7%	21.1%
No financials update	13.9%	1.9%
Financials update	59.6%	24.6%

Panel B.	% Single-lender (SL) loans	% Syndicated (SD) loans	*t*-stat
Total # audits / Total # of obs. for loan	12.9%	28.8%	-222.3
Total # financial updates / Total # of obs. for loan	32.0%	45.5%	-151.1
# Audits in last year/ Total # of obs. for loan	2.8%	2.6%	5.28
# Financial updates in last year/ Total # of obs. for loan	6.7%	3.5%	54.8

Table 10: Summary statistics on monitoring intensity and syndication status. Both panels are constructed at the loan level. There are 390572 loans in the sample. Panel A shows how likely different loan types are to be audited between origination and termination, and how likely the borrower is to update their financial between origination and termination. The numbers reported are percentages of the total number of loans in the sample. For each sorting of the loans (No audit/Audit, Financials update/No financials update) the numbers should add up to 100%, up to rounding error. Panel B shows the number of observations where financials are newly audited, and the number of observations where the borrower updates their financial, as a fraction of the total number of quarters between origination and termination. In the top part of the panel, the numerator in these ratios is the total number of events; in the bottom part of the panel, the numerator is the number of events occurring during the last year before the termination of the loan. T-statistics for differences of means are reported in the last column.

	$\mathbf{1}\{\text{Financials update}\}_{l,t}$			$\mathbf{1}\{\text{Audit}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	13.4	1.1	0.9	11.1	4.7	0.1
	(0.52)	(0.30)	(0.27)	(0.43)	(0.31)	(0.22)
mean rate	25.6%	31.3%	33.5%	10.5%	13.7%	18.0%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✓	✗	✓	✓
loan controls	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓
bor. with SL & SD loans	✗	✗	✓	✗	✗	✓
# obs	3927k	2572k	1052k	3927k	2572k	1052k
# loans	391k	288k	116k	391k	288k	116k
# borrowers	155k	93k	7k	155k	93k	7k

Table 11: Monitoring intensity and syndication status in the loan-quarter sample. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level. The specifications are summarized in Equations (3)-(5). The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. The two dependent variables are either an indicator for whether the borrower's financials, as reported in the loan schedule, were updated in the last quarter; or whether the loan schedule reports that the borrower was audited in the last quarter. For each of the two dependent variables, we consider a specification with no independent variables other than syndication status, a specification that includes lender-by-quarter fixed effects and controls for loan and borrower characteristics, and a specification restricted to firms that have at least one single-lender and one syndicated loan but that includes both lender and borrower by quarter fixed effects. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	$M_{l,t}^{(h)}$			$M_{l,t}^{(h)}$		
$\mathbf{1}\{\text{Financials update}\}_{l,t}$	9.1	6.8	8.2			
	(0.33)	(0.20)	(0.24)			
$\mathbf{1}\{\text{Audit}\}_{l,t}$				9.1	6.6	6.3
				(0.34)	(0.22)	(0.27)
mean rate	26.3%	29.1%	32.9%	26.3%	29.1%	32.9%
lender × quarter f.e.	✗	✓	✓	✗	✓	✓
sector × quarter f.e.	✗	✓	✓	✗	✓	✓
loan controls	✗	✓	✓	✗	✓	✓
borrower controls	✗	✓	✗	✗	✓	✗
borrower × quarter f.e.	✗	✗	✓	✗	✗	✓
bor. with multiple loans	✗	✗	✓	✗	✗	✓
# obs	3927K	2572K	1052K	3927K	2572K	1052K
# loans	391K	288K	116K	391K	288K	116K
# borrowers	155K	93K	7K	155K	93K	7K

Table 12: Modification rates and monitoring intensity in the loan-quarter sample. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level. The specifications are summarized in Equation (7)-(9). The line "mean rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. The dependent variable $M_{l,t}^{(h)}$ measures whether the loan is modified in any quarters from t to $t+h$; see Equation (6). The two independent variables of interest are either an indicator for whether the borrower's financials, as reported in the loan schedule, were updated in the last quarter; or whether the loan schedule reports that the borrower was audited in the last quarter. For each of the two independent variables, we consider a specification with no other controls or fixed effect, a specification that includes lender-by-quarter fixed effects and controls for loan and borrower characteristics, and a specification restricted to firms that have multiple loans outstanding, but that includes both lender and borrower by quarter fixed effects. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

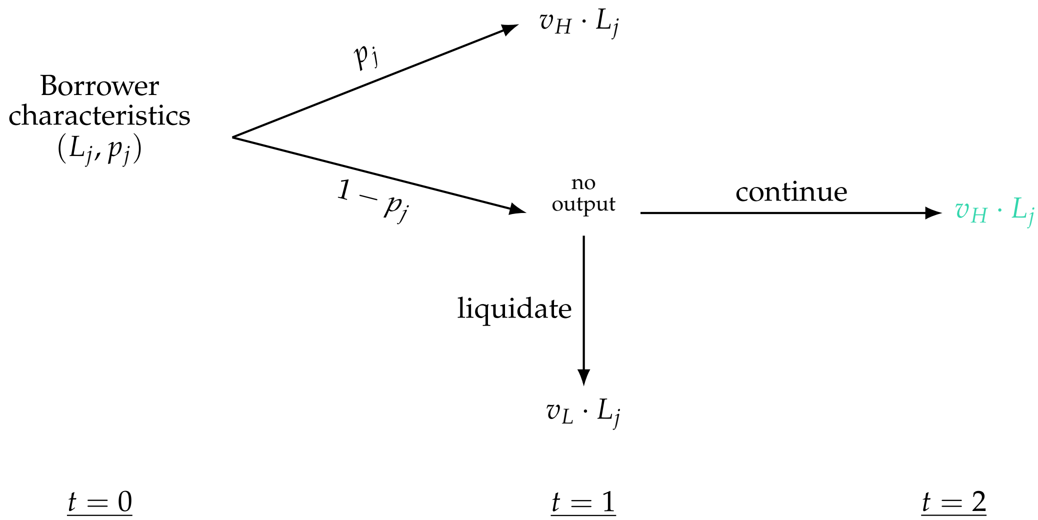
	$\mathbf{1}\{\text{Modification}\}_{l,t}$			$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$			$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_l$	7.8		5.1	-2.6		-3.4	10.8		8.2
	(0.22)		(0.24)	(0.13)		(0.13)	(0.20)		(0.22)
$\log(\text{Commitment}_l)$		3.1	2.6		0.4	0.8		3.3	2.4
		(0.06)	(0.07)		(0.05)	(0.05)		(0.06)	(0.06)
mean modification rate	14.9%	15.1%	15.1%	6.8%	6.8%	6.8%	9.6%	9.7%	9.7%
lender × quarter f.e.	✓	✓	✓	✓	✓	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓	✓	✓	✓	✓	✓
loan controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
borrower controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
# obs	2572k	2547k	2547k	2572k	2547k	2547k	2572k	2547k	2547k
# loans	288k	288k	288k	288k	288k	288k	288k	288k	288k
# borrowers	93k	93k	93k	93k	93k	93k	93k	93k	93k

Table 13: Size, syndication status, and flexibility. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (22). The line "mean modification rate" indicates the unconditional average of the dependent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first three columns, a modification is defined as either a maturity extension, or a modification of interest rates. In each specification, we include lender by quarter and sector by quarter fixed effects. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$	$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$	$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$
$\mathbf{1}\{\text{Syndication}\}_{l}$	8.6	−2.2	11.0
	(0.31)	(0.15)	(0.30)
$\mathbf{1}\{\text{Multi-loan borrower}\}_{b(l),t}$	−0.8	−1.4	0.5
	(0.15)	(0.11)	(0.28)
mean rate	13.2%	6.5%	7.9%
lender × quarter f.e.	✓	✓	✓
sector × quarter f.e.	✓	✓	✓
loan controls	✓	✓	✓
# obs	3810k	3810k	3810k
# loans	379k	379k	379k
# borrowers	149k	149k	149k

Table 14: Creditor dispersion and loan modification rates. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1) with an additional indicator for whether or not the borrower associated with a loan has multiple existing banking relationships. The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. Loan controls are maturity at origination fixed effects In the first column, a modification is defined as either a maturity extension or a modification of interest rates. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

A. Type G borrower ($q_j = 1$)



B. Type B borrower ($q_j = 0$)

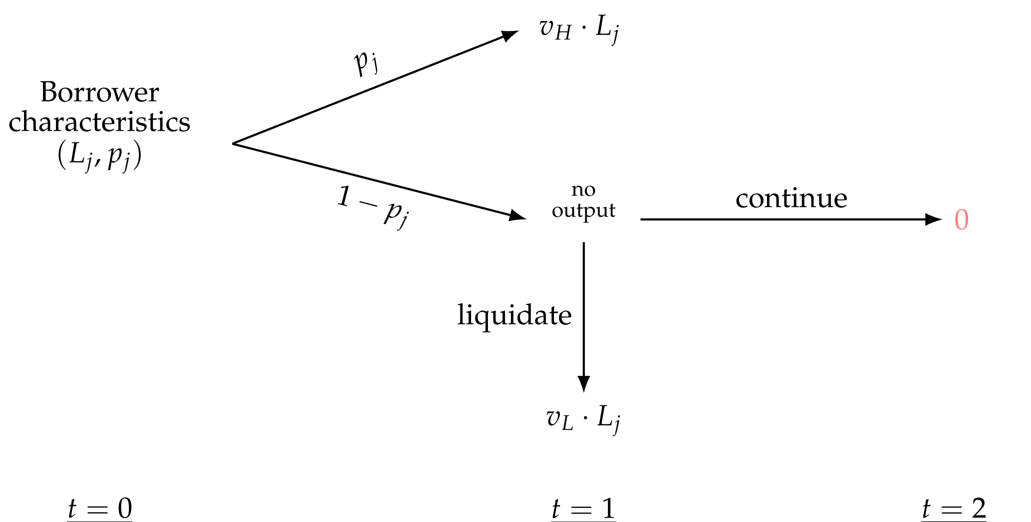


Figure Caption 1: Timing for project output in the model of Section 5. The top panel describes the timing for a borrower of type G, whose project succeeds with certainty at $t = 2$ conditional on not having succeeded at time $t = 1$. The bottom panel describes the timing for a borrower of type B, whose project fails with certainty at $t = 2$ conditional on not having succeeded at time $t = 1$.

Alt text: The figure is a schematic of the timing of the model. In panel A, for the type G borrower there is a probability of p that the investment project succeeds in period $t = 1$ and $1 - p_j$ that it does not. In t=1 the project is either liquidated or continues and then succeeds in period $t = 2$. In panel B, for the type B borrower with $q_j = 0$, there is also a probability p_j that the project succeeds in period $t = 1$ and probability $1 - p_j$ that it does not. Similarly, in $t = 1$ the project is either liquidated or continues to period $t = 2$ where it does not succeed.

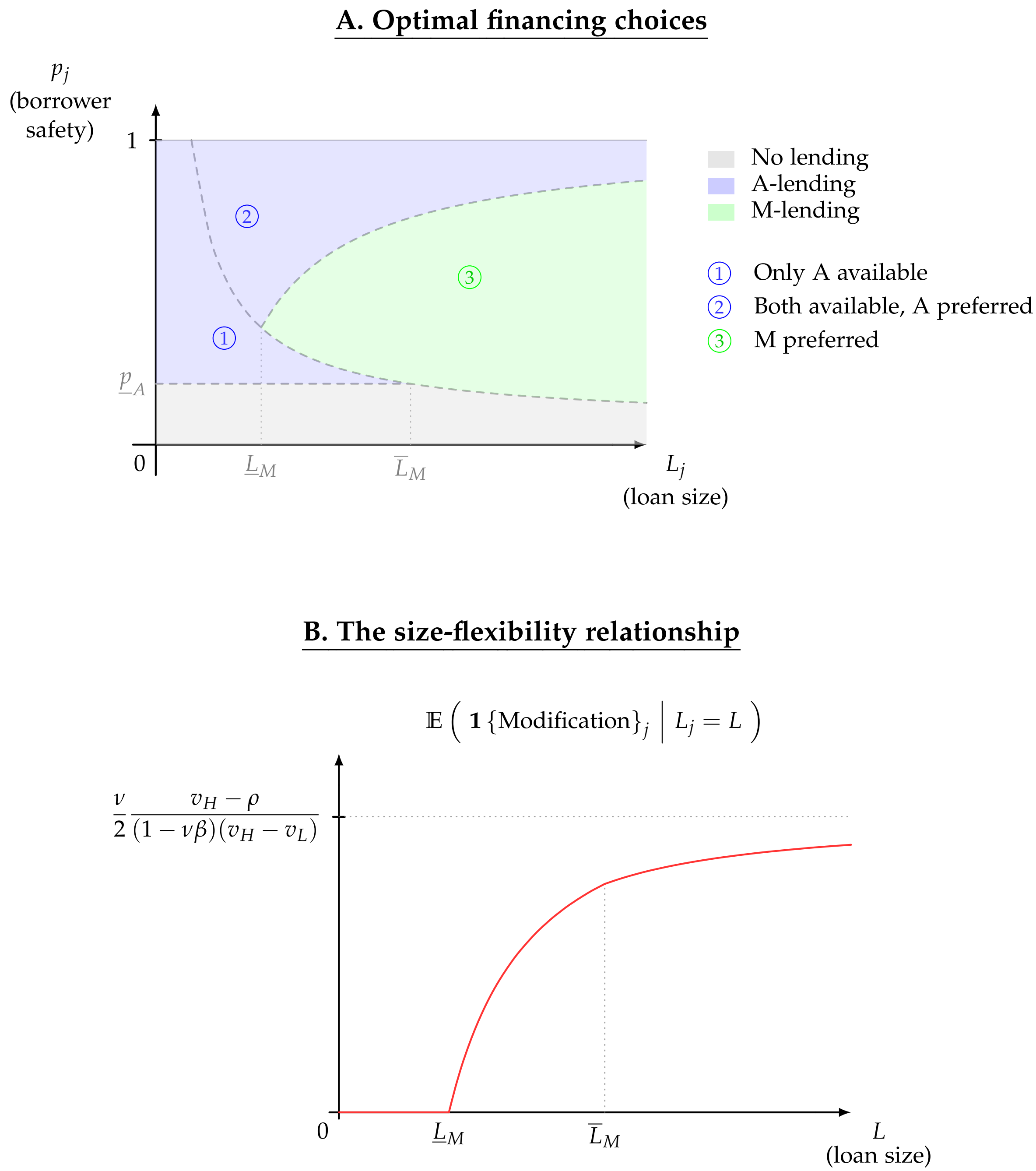


Figure Caption 2: Optimal financing choices in the model of Section 5.1, and their implications. Panel A shows the optimal choice of M versus A contracts, as a function of observable borrower characteristics (L_j, p_j). In the grey shaded region, no lending contracts are available; in the blue shaded regions, borrowers choose A-lending contracts; in the green shaded region, borrowers choose M-lending contracts. The threshold $\underline{p}_A$ is defining Equation (13), while the thresholds $\underline{L}_M$ and $\overline{L}_M$ are defined in Appendix A.8. Panel B shows the probability of loan modification as a function of loan size L_j, assuming a uniform distribution over types p_j.
Alt text: The top panel shows the regions by type of lending. The x-axis is loan size and ranges from 0 to L and the y-axis is p_j which is borrower safety and ranges from 0 to 1. There is a square for values below y-value $\underline{P}_A$ where there is no lending. Above this line there are three regions 1) from x-value 0 to $\overline{L}_M$ where A-lending is only available with a vertical line that slopes up from $\underline{P}_A$ toward 1, 2) from $\underline{L}_M$ and well above $\underline{P}_A$ where both A and M lending are available, but A is preferred, and 3) a region to the right of $\underline{L}_M$ where M is preferred. The bottom panel shows the relationship between size and flexibility. The x-axis is loan size and ranges from 0 to L and the y-axis is the probability of modification ranging from 0 to $(\nu/2) * (v_h - \rho)/(2 * (1 - \nu\beta) * (v_h - v_l)$. There is a line plotted that has y-value 0 from 0 to $\underline{L}_M$ and then slopes upward to $\overline{L}_M$. There after it slopes upward more gently approaching the limit of the y-axis.

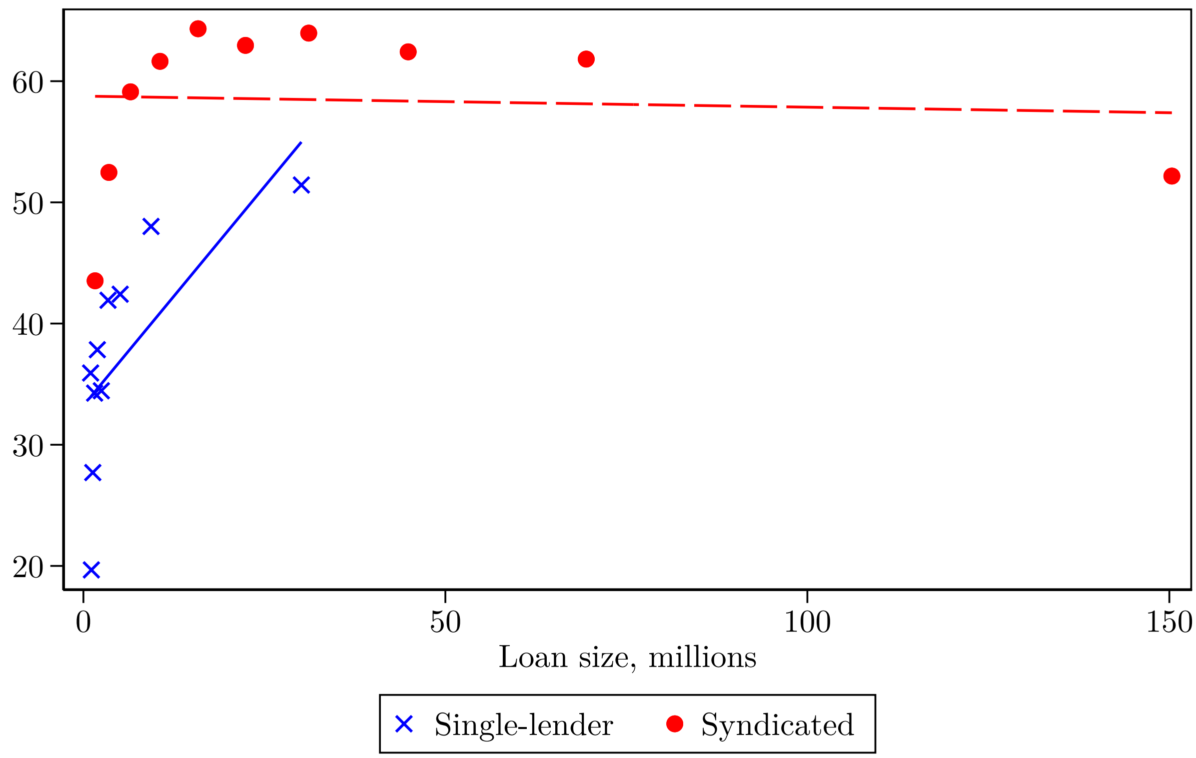


Figure Caption 3: Modification rates and loan size. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. Loan modifications are defined as in Section 3. The horizontal axis is loan size, expressed in millions of $, and the vertical axis is the fraction of loans modified at least once after issuance within that size bin. Size is defined as the committed exposure at the time of first origination of the loan. Red circles correspond to syndicated loans, while blue Xs correspond to single-lender loans. The data are residualized with respect to sector-time, lender-time, and maturity at origination fixed effects before constructing the binned scatterplots. The corresponding underlying size distribution of commitments is reported in Appendix Figure A-6.

Alt text: The figure shows the role of loan size in loan size in modifications and renegotiations in binned scatter plots. The figure shows that larger loans are more likely to be either renegotiated or modified and syndicated. The top panel plots binned scatter plots with regression lines for loan modifications. The x-axis is loan size and ranges from $0 to $150 million. The y-axis is average modification rates and ranges from 20% to 70%. The first scatter plot is for single-lender loans and is more or less a straight line from the x,y pairs of ($0,30%) to ($10,45%) with the final observation a bit flatter at about ($45,50%). The second scatter plot is for syndicated loans and it starts at x,y pair ($5,45%), rises to a peak of ($25,65%), and then tapers downward to end at ($150,50%). The scatter plots do no overlap because modification rates are much higher on average for syndicated loans.

Internet Appendix for “Debt Flexibility”

November 2025

A.1 Details on data construction

A.1.1 The FR Y14-Q schedule H.1

This appendix provides more details on our treatment of the Schedule H.1 data. The data have a loan-by-quarter panel structure.

A.1.1.1 Variable definitions and sample selection

The variables we use rely on (a) underlying fields corresponding to the variables defined in the FR Y-14Q reporting instructions; and (b) identifiers which we define and construct ourselves.[46] The following listing contains a description of these variables.

Variable	Field	Description and Cleaning Steps
`date_q`	N/A	quarterly reporting date
`BHC`	N/A	bank holding company identifier
`loanID`	15, 16	Using `InternalCreditFacilityID`, `OriginalInternalCreditFacilityID`, `date_q`, `BHC` uniquely identify a loan.
`borrowerID`	4, 9, 13, 14	1. drop loans missing `obligorname`, `tin`, `tickersymbol`, and `cusip` 2. fill in missing `tin` when `obligorname` matches 3. create borrower id for each `obligorname` or `tin`
`IndustryCode`	8	NAICS, SIC, or GICS code reported to 4 to 6 digits
`committed_flag`	24	Loans where `committedexposure` increases by more than 10 percent are flagged.
`variability`	37	1. Because loans can be reported as "fully undrawn", fill forward from the previous `variability` 2. Then backfill if "fully undrawn" A change in variability is flagged as positive when a loan goes from fixed (1) to either floating (2), mixed (3), or fee-based (4) and vice versa for negative. These changes are rare and only occur for about 5% of loans.
`interestrate`	38	For fixed rate loans, as indicated by the cleaned `variability` variable 1. Fill forward with the previous `interestrate` if its 0 or missing because the loan is fully undrawn as indicated by field 37 2. Back fill with the next `interestrate` if its 0 or missing because the loan is fully undrawn as indicated by field 37 A change in `interestrate` greater than 5 bps is flagged if the loan has exited the syndication pipeline. Our results are robust to using a threshold of 10 or 15 bps.
`interestratespread`	40	For non-fixed rate loans, as indicated by the cleaned `variability` variable 1. Fill forward with the previous `interestratespread` if its 0 or missing because the loan is fully undrawn as indicated by field 37 2. Fill backward with the previous `interestratespread` if its 0 or missing because the loan is fully undrawn as indicated by field 37 3. For fixed rate loans out of the syndicated loan pipeline, set `interestratespread` as the `interestrate` less the Treasury yield that matches the remaining maturity of loan if the remaining maturity is greater than one year. Otherwise, use `interestrate` less prime if the remaining maturity of the loan is less than one year A change in `interestratespread` greater than 5 bps is flagged if the loan has exited the syndication pipeline. Results are robust to a threshold of 10 or 15 bps.

[46] See pages 169 to 221 of https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=5bc5f538-ec2f-41ed-9b4c-b6265c0a428c.

interestrate_flag		The composite of either a flagged change in interestrate for fixed rate loans or interestratespread for all other loans including floating rate loans
maturitydate	19	1. If maturitydate is missing, fill forward as long it is greater than date_q, i.e. the loan did not mature in the previous period 2. Backfill maturity date if it's missing and greater than or equal date_q A change in maturitydate is flagged when loans have exited the syndication pipeline.
modification_flag		The maximum of flagged changes in maturitydate and interestrate_flag
securitytype	36	A change in securitytype is flagged after 2012:Q2 and is a positive change if it goes from unsecured (6) to secured (0,1,2,3,4,5) and vice versa for negative.
renewaldate	91	1. If renewaldate== maturitydate and renewaldate>date_q, replace renewaldate with date_q and fill forward 2. If originationdate==renewaldate, set renewaldate to originationdate in the quarter prior to the accidental change in originationdate 3. Fill forward renewaldate if missing 4. Replace with max of renewaldate and originationdate if originationdate is backwards moving 5. Fill forward renewaldate again if missing 6. Fill backward renewaldate again if missing 7. If renewaldate> date_q and prior observations are missing, set to date_q 8. If a change in renewaldate is recorded one quarter after it occurs, set it to the quarter when it occurs A change in renewaldate for loans not in the syndicated pipeline is flagged when the updated renewaldate is within one quarter of date_q. Because of the quarterly frequency, we only flag changes in renewaldate that occur more than 92 days apart.
originationdate	18	1. backfill originationdate if it is blank or is backwards moving. It can be backwards moving if renewaldate==originationdate 2. If originationdate> date_q and prior observations are missing, set equal to the previous originationdate 3. If a re-origination is recorded one quarter after it occurs, set it to the quarter when it occurs A change in originationdate is flagged under the same criteria as renewaldate described above
date_of_financials	52	See section A.1.1.2.
total_assets	70	See section A.1.1.2.
net_income	59	See section A.1.1.2.

Appendix Table A-7 describes the sample selection steps we apply to arrive at our analysis sample, along with the number of observations remaining at each step.

A.1.1.2 Firm level financial and loan/borrower level controls

Our regression specifications use various borrower and loan level controls as well as several borrower-level financial variables from the FR Y-14Q. Financial variables are available at the loan level at the quarterly frequency. However, each quarterly observation does not necessarily reflect up-to-date financial information. Instead, the variable date_of_financials, reports the date the financial information was updated last. In practice, financial data is updated somewhat irregularly, but typically new data are available at least annually for each loan. Using our constructed borrower identifier we take the median value of the financial variable at hand across all available observations for a given borrower at a given date (for the financials). Finally, we observe whether a borrower is public or private by merging the FR Y-14Q with Compustat.

In our panel regressions, the loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income-to-asset ratio; the ratio of current to total assets.

A.1.1.3 Syndication and agent status

We use the variable `participationflag` to classify loans between syndicated and single-lender loans. Because other variables related to syndication—such as `sncinternalcredit`, `participationinterest`, and `syndicatedloanflag`—are not available for the full sample, we do not use these to define syndicated loans. Instructions to reporting banks regarding `participationflag` changed in 2016:Q2:

- Before 2016:Q2, reporting instructions are:[47] *Indicate if the credit facility is participated or syndicated among other financial institutions.*
    1. *No*
    2. *Yes, purchased by reporting BHC [bank holding company]*
    3. *Yes, sold by reporting BHC [bank holding company]*
- After 2016:Q2, reporting instructions are:[48] *Indicate if the credit facility is participated or syndicated among other financial institutions and if it is part of the Shared National Credit Program. For fronting exposures report option 1, "No".*
    1. *No*
    2. *Yes, syndicate/participant in syndication but does not meet the definition of a Shared National Credit*
    3. *Yes, agent in syndication or participation but does not meet the definition of a Shared National Credit*
    4. *Yes, syndicate/participant in Shared National Credit*
    5. *Yes, agent in Shared National Credit*

We define syndicated loans as those where the last observation `participationflag` $\neq 1$, and single-lender loans as the remainder. Additionally, we exclude loans that never exit the syndication pipeline. Finally, after 2016:Q2, we use the additional information reported in the variable `participationflag` to determine whether the reporting bank is acting as the agent in the syndication to which the loan tranche belongs (values 3 or 5).

[47] See https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20140331_i.pdf, p.183, field 34.
[48] See https://www.federalreserve.gov/reportforms/forms/FR_Y-14Q20160930_i.pdf, p.202, field 34.

A.1.1.4 Internal loan ratings

Banks are required to submit their `internalrating` for each obligor. As there is no standardized rating across banks, staff of the Federal Reserve System has internally standardized the ratings on a scale from 1-10, with 1 being the lowest and 10 being the highest rating. These ratings are then further mapped to various agency ratings such as S&P. Table 4 showed how financial distress, as measured by a deterioration in the internal loan rating, is correlated with the likelihood of various loan modifications.

A.1.2 Shared National Credit (SNC) registry data

The SNC database is a periodic and random subsample of the SNC portfolio, providing information on whether each loan under review is either currently in violation of a covenant, or whether, at some point in the six months preceding the review, the loan experienced a violation that was since remedied. For each loan-quarter observation in the FR Y14-Q data that we successfully merge to the SNC covenant review sample, we use this information to measure whether a covenant violation has occurred at any point in the last two quarters preceding reporting of loan terms the FR Y14-Q. In what follows we provide more details on our merging procedure.

The SNC data has an annual frequency from May 2004 to May 2014. After that, the data are bi-annual, though the quarters of reporting vary from year to year. The reporting threshold changed from $20m to $100m (at origination) in January 2018. As a result, there is a significant drop in the number of loans from 2018:Q1 to 2018:Q3 (the next observation) from about 11,500 observations for `snc_credit_ids` (the SNC identifier, described below) to about 8500. Even though there are two reviews per year, some loans are only audited once a year. For example, of the loans originated before 2018, only about 70 percent appear in 2018, the remaining 30 percent only once. Like in the FR Y-14Q, loans in the SNC do not necessarily show up on their quarter of origination. Each loan-by-time observation is classified as either non-compliant if the borrower has breached a covenant threshold as of the end of the year, or compliant after receiving a waiver or an amendment if the borrower has not breached a covenant threshold after it was reset, but would have otherwise breached it (if it had not been reset) as of the end of the year. We classify a borrower's loan covenants to be binding in a given year if the borrower is either non-compliant or compliant after receiving a waiver or an amendment on one of its credit agreements in that year.

The following listing compares the concepts of loans, agents, and participants across the FR Y-14Q and the SNC data.

Definition	SNC (snc_credit_id×year or half-year)	FR Y-14Q (loanID×quarter)
Loan	snc_credit_id is formally a *credit* which is any loan or commitment to extend credit, or group of commitments, aggregating $100 million or more at origination; and committed under a formal lending arrangement; and shared by three or more unaffiliated supervised institutions.[49] A non-bank subsidiary of a holding company is considered a supervised institution	loanID is a loan or lease with a committed balance greater than or equal to $1 million reported at the credit facility level. For purposes of this collection, a credit facility is defined as a credit extension to a legal entity under a specific credit agreement
Agent	agent_rssd_id never more than 1 agent per credit; agent is also a participant in 92% of loans and the review bank for 90%[50]	participationflag lead bank in a syndication
Participant	participant_rssd_id each participant has one entry per *t* for a given snc_credit_id	participationflag lender in a syndication

Our merge procedure takes into account the following points:

- snc_credit_id is a superset of loanID because snc_credit_id in the SNC identifies the syndicate while loanID in the FR Y-14Q identifies the tranches of each syndicate. All FR Y-14Q statistics are computed at the level of snc_credit_id which is populated from the SNC merge. One snc_credit_id can correspond to multiple loanIDs.
- In theory, the agent, participants, and review banks' internal ID should correspond to sncinternalcreditid in the FR Y-14Q. In practice, this does not always hold. Therefore, we merge sequentially. First, we identify those loans in the Y14 that are uniquely identified by any of the following characteristics:

  1. bhc internalcreditid date
  2. bhc sncinternalcreditid date_q
  3. obligorname bhc date_q originationdate (weekly)
  4. obligorname bhc date_q zipcodeforeignmailingcode
  5. obligorname bhc date_q committed
  6. obligorname bhc financialsdate committed
  7. zipcodeforeignmailingcode bhc date_q committed
  8. zipcodeforeignmailingcode bhc date_q originationdate (weekly)

We then merge the SNC data sequentially using the corresponding variables (review_date, partissant_rssd_id, share_commitment_amt, obligor_legal_name, review_date, commitment_amt_as_o with the uniquely identified Y14 data. For those merges that do not include loan commitments (or are merged on the provided snc identifier), we only keep matches in which committed amounts in Y14 and SNC are within a five percent margin, to allow for the fact that committed amounts could be reported during different times in the quarter. Finally, we more Y14 data loans not uniquely identified by characteristics in 3. and 4. on those identifiers to the relevant SNC variable and keep uniquely matched loans as long as they satisfy the aforementioned criteria on commitment. Appendix Table A-3 reports summary statistics on the

[49] These are financial institutions subject to regulation by one of the three regulatory agencies.

[50] For 90% of the loans a review bank is also a participant.

merge. The top panel shows the merge between the SNC sample and the FR Y14-Q, while the bottom panel shows the merge between the SNC covenant review sample and the FR Y14-Q.

A.1.3 Dealscan data

The Dealscan data (Chava and Roberts, 2008; Schwert, 2018) is a dataset of loan syndications containing primarily information on loans at the time of their origination. The information is collected at both the syndicate and tranche levels. We are interested in collecting information on whether the loan features a performance pricing grid. This information is encoded in the variables `performance_pricing`, `performance_pricing_grid` and `performance_pricing_remark`.

Merging Dealscan and the FR Y14-Q is challenging because there is no common identifier linking both. The basic unit of observation in the FR Y14-Q data is a loan, corresponding by a security held by a bank on its balance sheet. Each loan has flag for syndication status, as discussed above. Loans recorded in the FR Y14-Q may belong to different tranches of the same syndication in Dealscan. However, the FR Y14-Q does not provide an identifier across loans belonging to each syndication, or to particular tranches of a syndication. On the other hand, while Dealscan records the list of participants to each tranche of each syndication. However, it does not contain information on how each tranche are allocated across participants, so that we cannot use committed exposure to identify loans in the FR Y14-Q to tranches in Dealscan. As a consequence, we pursue 2 merge strategies to merge the Y-14 and Dealscan:

- Strategy 1: We merge loans from the FR Y14-Q to syndication tranches in Dealscan based on borrower name, weekly origination date (weekly) and bank name. To do so, we only keep observations (loans in the FR Y14-Q and syndications in Dealscan) that are uniquely identified by these 3 variables. To see the potential issues with this merging procedure, suppose that in Dealscan, a bank participates in several tranches in a syndicated deal to a particular firm in a particular week. In the Dealscan data, which we use collapsed to the bank-borrower-week level, the (borrower name, bank name, date) combination would identify a unique syndication. In the FR Y14-Q, it would identify two different loans. As a result, in the FR Y14-Q, we would drop the two observations, but in Dealscan we would keep the syndication, and we would fail to merge, despite the tranches being in the FR Y14-Q and the syndication being in Dealscan. We thus think this is a lower bound a merge.

- Strategy 2: This approach is identical to Strategy 1, but we keep all FR Y14-Q loans that the previous approach had discarded. That is, we keep FR Y14-Q loans that are not uniquely identified by name, bank, origination week. The advantage of this approach is that we do not discard FR Y14-Q loans that may be in Dealscan, but are simply not uniquely identified by these 3 characteristics. The disadvantage with this Approach 2 is that it might create false positives, by improperly attributing an FR Y14-Q loan between a (bank, borrower) pair in a given week to a particular Dealscan syndication. Using this approach yields the maximum number of matches between FR Y14-Q and Dealscan when merging on borrower name, weekly origination date (weekly) and bank name and therefore should yield an upper bound on the number of matches between the two datasets.

The results reported in Appendix Tables 7-8 are constructed using Strategy 1. The results using Strategy 2 are qualitatively similar and quantitatively close; they are available upon request.

A.2 Bankruptcy results

Data is from New Generation Research. We use information on business bankruptcy filings for Chapter 7 and 11. The bankruptcy data is taken from the filings at state bankruptcy courts. We focus on Chapter 7 and 11 as they comprise the overwhelming majority of cases in our sample period. We merge the bankruptcy filings to the FR Y-14Q using quarterly dates, company names, 6-digit CUSIP, and zip code. Our matching algorithm sequentially matches borrowers in the following order. We first match the bankruptcy data to the FR Y-14Q by date-tin-name-zip, any unmatched observations then get matched by date-tin-name-CUSIP. We continue this matching procedure with date-tin-name-state, date-tin-name, date-tin-zip, date-tin-CUSIP, date-name-zip, date-tin-state, date-name-state, date-tin, date-cusip, and ultimately date-name.

Out of the 18,766 borrowers that file for bankruptcy during our sample period and report more than $1 million in book assets at filing, we are able to match 915 with active loans prior to filing in our sample, corresponding to about 22,000 loans.

Appendix Table A-8 describes modification patterns for loans of bankrupt borrowers. We note three main findings. First, the top panel shows that, compared to borrowers that do not enter bankruptcy, loans to borrowers that eventually enter bankruptcy are slightly less likely to be modified; overall modification rates are 42% in the full sample, and 39% in the sample of firms that eventually enter bankruptcy. Second, the fact that SD loans have higher modification rates remains true of firms that enter bankruptcy; 49% of SD loans are modified in the sample of SD loans of bankrupt firms, while only 28% of SL loans are modified. Finally, Appendix Table A-8 also shows that only one-third of all loan modifications within the bankruptcy sample group occur while bankruptcy proceedings are ongoing. The other two-thirds of modifications occurs outside the bankruptcy process (either before or after). Thus, even for firms that enter bankruptcy, modifications appear to occur outside of times of outright distress.

A.3 Loan modifications during COVID

Appendix Figure A-4 shows that modification rates were unusually elevated after the start of the COVID pandemic. Total modification rates spiked in 2020:Q1, particularly for SD loans. Since then, modification rates of SD loans have trended slightly upward, reaching approximately 25% of all loan-quarter observations in 2023:Q3 (our last quarter of data), compared to the 20% average modification rate for these loans pre-COVID.

The top panel of Appendix Figure A-7 focuses on the period ranging from 2019:Q1 to 2023:Q3, and reports the rates of renewals and re-originations in our data. In contrast to modification rates, neither of these types of events show a surge in frequency during or after the COVID pandemic. This suggests that, to the extent that lenders used loan flexibility to provide relief to their borrowers, this was done through modification of key loan terms as opposed to a general overhaul of credit agreements. Consistent with the rest of our analysis, lenders seem to have offered more flexibility to SD borrowers than SL borrowers during this period.

In Appendix Figure A-8, we show that this change in modification rates is robust to controlling for borrower, lender, sector and maturity at origination. Specifically, we estimate a specification of the form:

$$Y_{i,t} = \gamma_{m,j,b} + \delta_t + \varepsilon_{i,m,j,b,t} \tag{A1}$$

restricted to the sample of 2019:Q1 to 2023:Q3, for loan i, borrower j, lender b, maturity at origination m, and quarterly date t. In Appendix Figure A-8, we report estimates of the time effects δ_t, using 2019:Q4 as the omitted category. In the top panel, the dependent variable is a dummy for whether the loan experiences a maturity extension; in the middle panel, the dependent variable is a dummy for whether the loan experiences a modification in interest rates; and in the bottom panel, the dependent variable is a dummy for whether the loan experiences a renewal. The main result is that most modifications appear to have taken the form of changes in interest rates; maturity extensions do not exhibit a significant change, while renewals exhibit a significant but economically small change. Appendix Figure A-9 confirms this result, accounting for potential fixed calendar quarter effects on modification and re-origination rates. Namely, in the sample restricted to 2017:Q1 to 2020:Q4, we estimate:

$$Y_{i,t} = \gamma_{m,j,b} + \sum_{q=1}^{4} \mathbf{1}\left\{q(t) = q\right\} \left(\alpha_q + \mathbf{1}\{t \geq 2020 : Q1\}\delta_q\right) + \varepsilon_{i,m,j,b,t} \tag{A2}$$

where $q(t)$ denotes the quarter corresponding to date t. Appendix Figure A-9 reports the point estimates for $\{\delta_q\}_{q=1}^{4}$, which represent the incremental likelihood of re-origination (top panel) and interest rate changes (bottom panel) compared to the average rates for that quarter over the 2017-2019 period. The top panel shows that, if anything, re-originations fell slightly compared to pre-COVID. Interest rate changes increased significantly (about 3p.p. higher, relative to a baseline of about 15%), though the increase was concentrated in 2020:Q1 and 2020:Q2. Thus overall, COVID was marked by an increase rate of loan modifications, particularly interest rate changes, and particularly among SD borrowers.

A.4 The timing of loan modifications

Appendix Figure A-5 speaks to differences in the timing of the different types of loan modifications across the two groups of loans. Panel A shows evidence for interest rate modifications, and Panel B for maturity extensions. Each panel contains non-parametric estimates of the hazard rate of each event. We group loans by initial maturity at issuance. The horizontal axis is the time from loan origination to the modification event.

The hazard rate estimates are derived from the Nelson-Aaalen estimator of the cumulative hazard rate (Aalen, 1978; Kalbfleisch and Prentice, 2011), which is given by:

$$\forall t = 6, ..., 35, \quad H(t) = \sum_{q=0}^{t} \frac{M(t-q)}{N(t-q)}. \tag{A3}$$

where $M(t)$ is the number of loans experiencing the event (interest rate change, or maturity extension) t quarters after origination, and $N(t)$ is the number of loans that are still in sample t quarters after origination. Intuitively, the estimator in Equation (A3) is obtained by summing the change in the share of active loans that experience the event during each quarter. We plot the first-difference of $H(t)$, which should be interpreted as the (instantaneous) hazard rate of modification of loans in quarter t.[51]

Panels A and B of Appendix Figure A-5 show that hazard rates of modification (either interest rates or maturity) generally increase as time to maturity declines.[52] If, over the life of the loan, borrower financial conditions change relative to origination, the incentive for either party to seek a loan modification would increase, generating the upward sloping relationship apparent in the data. Additionally, since the hazard rates we document only reflect the first modification, it may be that borrowers whose loans are not modified early on experience

[51] We report estimates for 1 to 7 years of maturity at origination primarily because our sample covers 10 years of data, so that there is substantial truncation for the majority of loans with maturities higher than 7 years.

[52] The only exception is the hazard rate of maturity extensions for seven-year SD loans, which shows a modest decline in the last two years to maturity.

greater changes in financial conditions, making a late modification more likely.

Focusing more specifically on Panel A of Appendix Figure A-5, we observe that interest rate changes are strictly more likely for SD loans than for SL loans at all points in the life of the loan, consistent with the results discussed above. Moreover, the increase in hazard rate over the life of the loan is steeper for SD loans than for SL loans. This suggests that lenders may be more responsive to changes in borrower condition in the context of SD lending relationships than in the context of SL lending relationships, a point we will come back to below, when we discuss the effects of financial distress.

Turning to Panel B of Appendix Figure A-5, which reports the hazard rate of maturity extensions, two main patterns stand out. First, loans of longer maturity at origination generally have lower hazard rates: the hazard rate of modification of five-year loans is, on average, approximately half that of one-year loans. Second, the hazard rates are broadly similar for SD and SL loans, except toward the end of the life of the loan, where there is a more marked increase in the hazard rate for SL loans.

A joint interpretation of these two facts is that maturity extensions primarily depend on remaining time to maturity, as opposed to the evolution of borrower creditworthiness. If that is the case, short-maturity loans should have higher likelihood of extension, as the data suggest. Additionally, if SL loans are less sensitive to evolving borrower credit conditions, then this horizon effect should be stronger for SL than SD loans. This appears to be the case in the data, particularly for long maturity loans, which show a very rapid increase in extension hazard rate as maturity approaches.

While a loan's hazard rate of modification generally increases over the life of the loan, the results also indicate that the timing of modifications differs between loan types. SD loans experience interest rate modifications throughout their life, whereas SL loans experience sharp increases in the likelihood of maturity extension toward the end of their life.

A.5 Evergreening

Section 3 shows that loan modifications often take the form of maturity extensions, particularly for SL loans. Additionally, these extensions disproportionately occur toward the end of the life of the loan and are the most common form of loan modification in the context of a renegotiation (as defined in Section 4.1.3). This tendency for banks to grant maturity extensions to small borrowers close to maturity brings to mind the notion of "evergreening". We use the term to refer to situations where lenders provide short-term relief to borrowers that are close to default, in the hope that this relief will spare the lender having to recognize loan losses (Faria-e Castro, Paul and Sánchez, 2024). Maturity extensions could be one of the mechanisms through which this relief is provided to near-insolvent borrowers.

We cannot rule out the fact that ad hoc maturity extensions are one of the tools through which evergreening occurs. In fact, the results of Section 3.4 suggest that financial distress increases the likelihood of a maturity extension, even if they are silent on whether these extensions are “efficient". However, loan modifications appear to be a broader phenomenon than evergreening. Appendix Table A-9 shows that the typical loan modification is *not* granted in times of financial distress. Specifically, the table reports the fraction of modifications happening outside and during financial distress (defined as a three quarter window around an internal downgrading of the loan). Even for SL loans, about 85% of all modifications and about 85% of maturity extensions occur outside financial distress. Thus, by and large, loan modifications occur outside financial distress, suggesting that other motives than evergreening are at play in the decisions to adjust loan terms.

A.6 Performance pricing grids

Section 4.1.2 shows that loans with PP grids experience lower rates of modification within the merged sample. This result might appear surprising. Here we show that is likely due to selection on unobservable borrower characteristics.

In Appendix Table A-4, we estimate regressions of the form:

$$Y_l = \alpha_{g(l)} + \beta X_l + \varepsilon_l,$$

where l is a loan, X_l is an indicator for whether a loan contains a PP grid in Dealscan, Y_l is an indicator for whether the loan experiences at least one interest rate modification in the FR Y-14 Q after its origination, and $\alpha_{g(l)}$ is a fixed effect. The regression is run on the sample of successfully merged SD loans. The results of Appendix Table A-4 show that while lender, sector, maturity at origination and origination date fixed effects do not overturn the finding, borrower fixed effects do. That is, within borrowers that have loans both with and without PP grids, the former are more likely to experience an interest rate change. This result is consistent with the possibility that, although PP grids facilitate rate modification, selection into access to PP grids offsets this effect, yielding lower modification rates overall.

A.7 Revisions to credit agreements

In this appendix we discuss our analysis of revisions to credit agreements. There are two potential types of revisions to credit agreements in the FR Y-14Q: re-originations and renewals. We start by defining both. We then discuss results on renewals. The main text reports the results on re-originations.

Data definitions The definition of the `originationdate` variable used to define re-originations is changed three times in our sample: in 2013:Q4, 2014:Q4, and 2016:Q4. Moreover, in 2014:Q4 the `originationdate` variable is split into the `renewaldate` variable. 2012:Q2 is the first available instructions form. The following listing clarifies the changes in variable definitions.

	`originationdate`				`renewaldate`
	2011:Q3-2013:Q3	2013:Q4-2014:Q3	2014:Q4-2016:Q3	2016:Q4-present	2014:Q4-present
Legally binding agreement	✓				
Legally binding commitment		✓	✓	✓	
Renewal	✓				✓
All credit actions that require bank approval	✓				
Change in contractual date of obligation	✓	✓			
New or amended and restated credit agreement			✓	✓	
Syndicated pipeline clarification				✓	
1. Extension options					
2. Covenants	✓				
3. Waivers	✓				
4. Change in maturity date	✓	✓			✓
5. Repricing	✓	✓			✓
6. Periodic credit reviews	✓	✓			

The following gives a more precise report of the different definitions used in the FR Y14-Q reporting guidelines:

- 2011:Q3 to 2013:Q3 definition: page 7, field 18.[53] *The date a credit facility becomes a legally binding agreement. If the credit facility has been renewed, use the renewal date as the Origination Date (except for extension options that were at the sole discretion of the obligor). The renewal date would include all credit actions that require bank approval and that change the contractual date of the obligation.*

- 2013:Q4 to 2014:Q3 definition: page 184, field 18.[54] *Report the origination date of the commitment. The "originationdate" is the date the commitment to lend becomes a legally binding*

[53]See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=92c98f5c-df39-46c4-97b8-2621d997432f. The file in the `.zip` folder is called `/FR Y-14Q/Wholesale/FR_Y-14Q_CorpLoan_2Q12.pdf`.

[54]See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=2f122a09-cf30-49fe-8a51-5f33682c26c8.

commitment. If there has been a major modification to the loan that requires credit approval such that the contractual date of the loan is changed in the loan system, use the revised contractual date as the "origination date." The following examples would generally not result in a change in the contractual date of the loan in the loan system, and thus would not be considered major modifications:

- *extension options at the sole discretion of the borrower*
- *covenants*
- *waivers*

- 2014:Q4 to 2016:Q3 definition: page 192, field 18.[55] *Report the origination date. The origination date is the date the commitment to lend becomes a legally binding commitment. If there has been a major modification to the loan such that the obligor execute a new or amended and restated credit agreement, use the revised contractual date of the credit agreement as the origination date. The following independent examples would generally not result in a change in the contractual date of the loan, and thus would not be considered major modifications:*

  - *extension options at the sole discretion of the borrower*
  - *covenants*
  - *waivers*
  - *change in the maturity date*
  - *repricing*
  - *periodic credit reviews*

  Additionally, exclude all renewals which meet the definition in "RenewalDate" Field 91

- 2016:Q4 to present definition: page 190, field 18.[56] *Report the origination date. The origination date is the date the commitment to lend becomes a legally binding commitment. If there has been a major modification to the loan such that the obligor execute a new or amended and restated credit agreement, use the revised contractual date of the credit agreement as the origination date. The following independent examples would generally not result in a change in the contractual date of the loan, and thus would not be considered major modifications:*

  - *extension options at the sole discretion of the borrower*
  - *covenants*
  - *waivers*
  - *change in the maturity date*
  - *repricing*

[55] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=7104872b-af71-4447-a59a-57956e39cafc.

[56] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=9b5fde96-9b92-40f0-a210-a4176aad2ab8.

· *periodic credit reviews*

Additionally, exclude all renewals which meet the definition in "RenewalDate" Field 91. For corporate loans and leases in the syndicated pipeline, report the date on which the BHC has extended terms to the borrower in the signed commitment letter (option 1 in field 100). Once the deal is reported as closed and settled (option 4 in Field 100), report the updated origination date per the definition above. For commitments to commit which are not syndicated, report the date on which the BHC extended terms to the borrower.

· 2014:Q4 to present definition: page 222, field 91.[57] *If the credit facility has been renewed per the terms of the original loan agreement, re-priced, or has a change in the maturity date such that the Origination Date did not change, report the date on which the most recent renewal notification became effective. If a credit facility has been renewed as part of a major modification such that the contractual date of the original loan is changed, then such date would be reported in Field 18 (Origination Date) and the BHC should report 9999-12-31 in this field. If the credit facility has not been renewed the BHC should report 9999-12-31 in this field.*

Results on renewals As highlighted above, a renewal refers to cases where the original maturity, the original interest rate, or some other core loan provision is changed without a change in the contractual date of the original loan, as is the case for re-originations. As explained in the definition of renewals above, reporting guidelines are unclear about whether banks should treat *only* modifications that result from existing contractual contingencies being triggered as renewals, or also include ad hoc ex post modifications that are sufficiently small in scope that they do not require a new credit agreement to be executed. Specifically, FR Y-14Q reporting instructions only indicate that extension options at the discretion of the borrower, changes in maturity dates, re-pricing, periodic credit reviews, waivers, or covenant modifications, should not be considered as a re-origination of the loan agreement, but only as a renewal. They do not explicitly indicate whether renewals should only be recorded when a contractual contingency is exercised or triggered. This is why we tabulate and analyze them separately from re-originations.

Appendix Table A-6 shows that renewals, like re-originations, should be thought of as a rough subset of modifications, as 60% of all renewals involve a modification and the quarterly frequency of renewal in our sample is approximately 3.5%. The most common form of observable loan modification at renewal is a maturity extension, which occurs for about half of all renewed loans. Appendix Table A-6 shows that, without controls, SL loans are more likely to be renewed than SD loans. Relative to SD loans, SL loans have a higher share of one-year credit lines (as indicated in Appendix Figure A-3), and these credit lines often tend

[57] See https://www.federalreserve.gov/apps/reportingforms/Download/DownloadAttachment?guid=7104872b-af71-4447-a59a-57956e39cafc.

to be renewed at maturity, potentially increasing the renewal rate of SL loans. To address this composition effect, we compare loans of similar maturity at origination. With these additional controls, we find that renewals are still significantly more like for SD loans than for SL loans. These results are reported in Table A-6, which estimates a specification similar to (1) that includes maturity at origination fixed effects. While this result stands in contrast with the behavior of re-origination, it is worth noting that renewals happen within the same borrower-lender pair. It is therefore possible that the lower renewal rate of SD loans is driven by greater availability of outside borrowing options for SD borrowers.

A.8 Additional theoretical results

A.8.1 Proofs and derivations for baseline model

Cost of debt and borrower value function under an A contract Under an A contract, the zero-profit condition of lenders is given by:

$$\rho L_j = p_j r_{A,j} L_j + (1 - p_j) v_L L_j. \tag{A4}$$

Note that this expression already assumes that if at $t = 1$, the borrower has not made the promised repayment, the lender assumes control and liquidates the project. Under an A-contract, at $t = 1$ the lender does not have any further information about borrower type. Suppose that upon renegotiation, the lender and borrower agree to a repayment $\tilde{r}_j L_j$ conditional on success at $t = 2$. Then the expected return to renegotiating for the lender is $\nu \tilde{r}_j L_j$, since there is a fraction ν of good types in the population of borrowers of observable type (L_j, p_j). Moreover, no borrower can credibly commit to a repayment $\tilde{r}_j > v_H$. Thus the expected return to renegotiating satisfies:

$$\nu \tilde{r}_j L_j \leq \nu v_H L_j < v_L L_j, \tag{A5}$$

where the latter condition holds because of the assumption stated in Equation (11) of the main text. Thus renegotiation is never optimal for the lender. Solving for the cost of debt, we obtain:

$$r_{A,j} = r_A(p_j) = \rho + \left(\frac{1}{p_j} - 1 \right) (\rho - v_L). \tag{A6}$$

A type G borrower's equity value is given by:

$$V_{A,j} \quad = \quad p_j \left(v_H - r_A(p_j) \right) L_j \tag{A7}$$

$$= p_j \left(v_H - r_A(p_j)\right) L_j - (1-p_j)v_L L_j + (1-p_j)v_L L_j \tag{A8}$$

$$= p_j \left(v_H - r_A(p_j)\right) L_j - (1-p_j)v_L L_j - (1-p_j)(v_H - v_L)L_j + (1-p_j)v_H L_j \tag{A9}$$

$$= v_H L_j - \rho L_j - (1-p_j)(v_H - v_L)L_j \tag{A10}$$

Thus $V_{A,j} = V_A(L_j, p_j)$, where:

$$\frac{V_A(L_j, p_j)}{L_j} = v_H - \rho - (1-p_j)(v_H - v_L) \tag{A11}$$

The participation constraint $r_{A,j} \geq 0$ then gives the range of observable types for which this contract is available, as described in Equation (13)

Cost of debt and borrower value function under an M contract Under an M contract, the zero-profit condition of lenders is given by:

$$\rho L_j + m = p_j r_{M,j} L_j + (1-p_j)(\nu \tilde{r}_j L_j + (1-\nu)v_L L_j), \tag{A12}$$

where $\tilde{r}_j L_j$ is the renegotiated debt repayment for type G borrowers. This expression already assumes that the lender always liquidates type B projects; this is optimal since type B projects have strictly positive liquidation value at $t = 1$ but zero value at $t = 2$.

Renegotiation between type G borrowers and lenders at $t = 1$ is the outcome of a simple Nash bargaining game. The lender's outside option is $v_L L_j$, while the borrower's outside option is 0. Thus the renegotiated repayment solves:

$$\tilde{r}_j = \arg\max_r (1-\beta) \log\left((v_H - r) L_j\right) + \beta \log\left((r - v_L)L_j\right) \quad \text{s.t.} \quad rL_j \leq v_H L_j. \tag{A13}$$

The solution is:

$$\tilde{r}_j = v_L + \beta(v_H - v_L). \tag{A14}$$

Note that this implies that the lender prefers renegotiation to liquidation so long as $\beta > 0$. With this expression, the cost of debt under an M contract becomes:

$$r_M(p_j, L_j) = \rho + \frac{m}{L_j} + \left(\frac{1}{p_j} - 1\right)\left(\rho + \frac{m}{L_j} - \{v_L + \nu\beta(v_H - v_L)\}\right) \tag{A15}$$

Derivations similar to those reported for the A contract imply that the equity value of a type

B borrower at $t = 0$ is given by:

$$\frac{V_M(L_j, p_j)}{L_j} = v_H - \rho - \frac{m}{L_j} - (1-\nu)\beta(1-p_j)\left(v_H - v_L\right) \tag{A16}$$

The participation constraint $r_{M,j} \geq 0$ then gives the range of observable types for which this contract is available, as described in Equation (16).

Proof of proposition 1 To prove proposition 1 we start by characterizing the regions of the state space in which each contract (or both) are available. A contracts are available for any p_j such that:

$$p_j \geq \underline{p}_A = \frac{\rho - v_L}{v_H - v_L}, \tag{A17}$$

which satisfies $0 < \underline{p}_A < 1$ by assumption (10). Moreover, M contracts are available for all firms such that:

$$p_j \geq \underline{p}_M(L_j) = \frac{\rho + \frac{m}{L_j} - (v_L + \nu\beta(v_H - v_L))}{(1-\nu\beta)(v_H - v_L)}. \tag{A18}$$

The function $\underline{p}_M(L_j)$ satisfies:

$$\lim_{L \to 0} \underline{p}_M(L) \quad = \quad +\infty \tag{A19}$$

$$\lim_{L \to +\infty} \underline{p}_M(L) \quad = \quad \frac{\rho - (v_L + \nu\beta(v_H - v_L))}{(1-\nu\beta)(v_H - v_L)} \tag{A20}$$

Define the function:

$$h(x) = \frac{\rho - x}{v_H - x} = 1 - \frac{v_H - \rho}{v_H - x}, \tag{A21}$$

which is strictly decreasing in x. Then $\underline{p}_A = h(v_L)$ and $\lim_{L \to +\infty} \underline{p}_M(L) = h(\tilde{v})$ where:

$$\tilde{v} = v_L + \nu\beta(v_H - v_L) > v_L, \tag{A22}$$

so that under our assumptions, $\underline{p}_A = h(v_L) > h(\tilde{v}) = \lim_{L \to +\infty} \underline{p}_M(L)$. Moreover the function $\underline{p}_M(L_j)$ is strictly decreasing in L_j. Thus there are two unique values $L_{0,M}$ and $\overline{L}_M > L_{0,M}$ such that:

$$\underline{p}_M(L_{0,M}) \quad = \quad 1, \tag{A23}$$

$$\underline{p}_M(\overline{L}_M) \quad = \quad \underline{p}_A. \tag{A24}$$

Solving for these two values we obtain:

$$L_{0,M} = \frac{m}{v_H - \rho} \tag{A25}$$

$$\overline{L}_M = \frac{1}{\nu\beta} L_{0,M} \tag{A26}$$

The state-space can then be partitioned as follows:

$$\mathcal{S}_0 = \left\{ \left(p_j, L_j\right) \text{ s.t. } L_j \leq \overline{L}_M \text{ and } p_j \leq \underline{p}_A, \text{ or } L_j \geq \overline{L}_M \text{ and } p_j \leq \underline{p}_M(L_j) \right\}$$

$$\mathcal{S}_1 = \left\{ \left(p_j, L_j\right) \text{ s.t. } L_j \leq \overline{L}_M \text{ and } p_j \in \left[\underline{p}_A, \underline{p}_M(L_j)\right] \right\}$$

$$\mathcal{S}_{2,3} = \left\{ \left(p_j, L_j\right) \text{ s.t. } L_j \in \left[L_{0,M}, \overline{L}_M\right] \text{ and } p_j \in \left[\underline{p}_M(L_j), 1\right], \text{ or } L_j \geq \overline{L}_M \text{ and } p_j \in \left[\underline{p}_A, 1\right] \right\}$$

$$\mathcal{S}_4 = \left\{ \left(p_j, L_j\right) \text{ s.t. } L_j \geq \overline{L}_M \text{ and } p_j \in \left[\underline{p}_M(L_j), \underline{p}_A\right] \right\}$$

If $(p_j, L_j) \in \mathcal{S}_0$, no lending contract is available. If $(p_j, L_j) \in \mathcal{S}_1$, only A contracts are available. If $(p_j, L_j) \in \mathcal{S}_{2,3}$ both types of contracts are available. And if $(p_j, L_j) \in \mathcal{S}_4$, only M contracts are available.

The last step is to characterize which contract is used by firms in the $\mathcal{S}_{2,3}$ region. Comparing equity values of G type borrowers at $t = 0$, we see that the threshold for choosing M contracts over A contracts is:

$$\underline{p}_{MA}(L_j) = 1 - \frac{m}{L_j} \frac{1}{(1 - (1 - \nu)\beta)(v_H - v_L)} \tag{A27}$$

The function $\underline{p}_{MA}(L)$ satisfies:

$$\lim_{L \to 0} \underline{p}_{MA}(L) = -\infty \tag{A28}$$

$$\lim_{L \to +\infty} \underline{p}_{MA}(L) = 1 > \lim_{L \to +\infty} \underline{p}_M(L), \tag{A29}$$

and it is a strictly increasing function. So it crosses $\underline{p}_M(L_j)$ exactly once. Solving for the crossing point we obtain:

$$\underline{L}_M = \frac{2 - \beta}{1 - (1 - \nu)\beta} L_{0,M} \tag{A30}$$

Clearly $\frac{2-\beta}{1-(1-\nu)\beta} > 1$. Moreover, $\frac{1}{\nu\beta} > \frac{2-\beta}{1-(1-\nu)\beta}$, if and only if,

$$(1 - \beta)(1 - \nu\beta) > 0, \tag{A31}$$

which is always true. Therefore $\overline{L}_M > \underline{L}_M$. The rest of proposition 1 follows.

The size-flexibility relationship The bottom panel of figure 2 derives the probability of a loan being modified conditional on its size, under the assumption that p_j follows a uniform distribution on $[0,1]$. Here we provide a derivation for the corresponding expressions.

Let $g(L)$ represent the probability of loan modification conditional on the size of the loan being equal to L. This is given by:

$$g(L) = \frac{\int_p h(L,p)dp}{D(L)}, \tag{A32}$$

where $h(L,p)$ is the ex-ante probability that a firm of observable type (L,p) with an outstanding loan will receive a loan modification, and $D(L)$ is the overall mass of firms with project size L that receive a loan. From the results of Proposition 1, we have:

$$D(L) = \begin{cases} 1 - \underline{p}_A & \text{if} \quad L \leq \overline{L}_M \\ 1 - \underline{p}_M(L) & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A33}$$

Moreover:

$$h(L,p) = \begin{cases} 0 & \text{if} \quad L \leq \underline{L}_M \\ 0 & \text{if} \quad L \geq \underline{L}_M \text{ and } p_j \notin \left[\underline{p}_M(L), \underline{p}_{MA}(L)\right] \\ \nu(1-p) & \text{if} \quad L \geq \underline{L}_M \text{ and } p_j \in \left[\underline{p}_M(L), \underline{p}_{MA}(L)\right] \end{cases} \tag{A34}$$

So the function $g(L)$ is given by:

$$g(L) = \begin{cases} 0 & \text{if} \quad L < \underline{L}_M \\ \dfrac{\nu}{1-\underline{p}_A} \displaystyle\int_{p_M(L)}^{p_{MA}(L)} (1-p)dp & \text{if} \quad L \in [\underline{L}_M, \overline{L}_M] \\ \dfrac{\nu}{1-\underline{p}_M(L)} \displaystyle\int_{p_M(L)}^{p_{MA}(L)} (1-p)dp & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A35}$$

Therefore, for $L \in \left(\underline{L}_M, \overline{L}_M\right)$,

$$\frac{g'(L)}{\nu} = \frac{1}{1-\underline{p}_A}\Big(p'_{MA}(L)(1-p_{MA}(L)) - p'_M(L)(1-p_M(L))\Big) > 0. \tag{A36}$$

For $L > \underline{L}_M$, on the other hand, we have:

$$\begin{aligned}
\frac{g'(L)}{\nu} &= p'_{MA}(L)\frac{1-p_{MA}(L))}{1-p_M(L)} - p'_M(L) + \frac{p'_M(L)}{(1-p_M(L))^2}\int_{p_M(L)}^{p_{MA}(L)}(1-p)dp \\
&= p'_{MA}(L)\frac{1-p_{MA}(L))}{1-p_M(L)} - p'_M(L) + \frac{1}{2}\left(1-\frac{(1-p_{MA}(L))^2}{(1-p_M(L))^2}\right)p'_M(L) \\
&= p'_{MA}(L)\frac{1-p_{MA}(L))}{1-p_M(L)} - \frac{1}{2}\left(1+\frac{(1-p_{MA}(L))^2}{(1-p_M(L))^2}\right)p'_M(L) > 0
\end{aligned}$$

Note that the explicit expression of $g(L)$ is:

$$g(L) = \begin{cases} 0 & \text{if} \quad L \leq \underline{L}_M \\ \nu\dfrac{\underline{p}_{MA}(L)-\underline{p}_M(L)}{1-\underline{p}_A}\left(1-\dfrac{1}{2}\left(\underline{p}_{MA}(L)+\underline{p}_M(L)\right)\right) & \text{if} \quad L \in [\underline{L}_M, \overline{L}_M] \\ \nu\dfrac{\underline{p}_{MA}(L)-\underline{p}_M(L)}{1-\underline{p}_M(L)}\left(1-\dfrac{1}{2}\left(\underline{p}_{MA}(L)+\underline{p}_M(L)\right)\right) & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A37}$$

In particular,

$$\lim_{L\to+\infty} g(L) = \frac{1}{2}\nu\frac{v_H-\rho}{(1-\nu\beta)(v_H-v_L)}. \tag{A38}$$

A.8.2 Model with monitoring costs paid ex-post

In this appendix we consider two variants of the model in which the monitoring is paid ex-post by the lender.

Commitment to monitor First, suppose that the lender in an M-contract can commit to monitor the borrower if the project does not succeed at time $t = 1$.

As before, liquidation is optimal for the borrower if ex-post monitoring reveals that the borrower is type B, while renegotiation is optimal if monitoring reveals that the borrower is type G. Therefore, the zero-profit condition of the borrower in an M-contract is:

$$\rho L_j = p_j r_{M,j} L_j + (1-p_j)(\nu\tilde{r}_j L_j + (1-\nu)v_L L_j - m), \tag{A39}$$

where:

$$\tilde{r}_j = v_L + \beta(v_H - v_L). \tag{A40}$$

The cost of debt under an M contract becomes:

$$r_M(p_j, L_j) = \rho + \left(\frac{1}{p_j} - 1\right)\left(\rho + \frac{m}{L_j} - \{v_L + \nu\beta(v_H - v_L)\}\right) \tag{A41}$$

The equity value of a type G borrower at $t = 0$ is given by:

$$\frac{V_M(L_j, p_j)}{L_j} = v_H - \rho - (1 - p_j)\frac{m}{L_j} - (1 - \nu)\beta(1 - p_j)\left(v_H - v_L\right) \tag{A42}$$

The participation constraint $r_{M,j} \geq 0$ then gives the range of observable types for which this contract is available:

$$p_j \geq \underline{p}_M(L_j) = \frac{\rho + \frac{m}{L_j} - (v_L + \nu\beta(v_H - v_L))}{\frac{m}{L_j} + (1 - \nu\beta)(v_H - v_L)}. \tag{A43}$$

This is a downward sloping function of loan size, L_j.

Derivations corresponding to the A contract are unchanged. The borrower chooses an M contract, if and only if, $V_M(L_j, p_j) - V_A(L_j, p_j) > 0$, which in this version of the model is equivalent to:

$$L_j \geq \underline{L}_M = \frac{m}{(v_H - v_L)(1 - (1 - \nu)\beta)} \equiv \underline{L}_M. \tag{A44}$$

In this case, the boundary for preferring an M to an A contract (conditional on the availability of both) is thus a vertical line. Additionally, the participation constraints for M and A contracts crosses at:

$$\overline{L}_M = \frac{m}{(v_H - v_L)\nu\beta} > \underline{L}_M. \tag{A45}$$

Finally, the function $g(L)$ describing the relationship between size and flexibility, in this version of the model, is given by:

$$g(L) = \begin{cases} 0 & \text{if} \quad L < \underline{L}_M \\ \dfrac{\nu}{1 - \underline{p}_A} \displaystyle\int_{p_M(L)}^{1} (1 - p)dp & \text{if} \quad L \in \left[\underline{L}_M, \overline{L}_M\right] \\ \dfrac{\nu}{1 - \underline{p}_M(L)} \displaystyle\int_{p_M(L)}^{1} (1 - p)dp & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A46}$$

The explicit expression is:

$$g(L) = \begin{cases} 0 & \text{if} \quad L < \underline{L}_M \\ \dfrac{\nu}{1-\underline{p}_A}\left(1-\underline{p}_M(L)\right)\left(1-\dfrac{1}{2}\left(1+\underline{p}_M(L)\right)\right) & \text{if} \quad L \in [\underline{L}_M, \overline{L}_M] \\ \nu\left(1-\dfrac{1}{2}\left(1+\underline{p}_M(L)\right)\right) & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A47}$$

This function is strictly increasing with respect to loan size L because $\underline{p}_M(L)$ is a strictly decreasing function of L, and satisfies:

$$\lim_{L\to+\infty} = \frac{\nu}{2}\frac{v_H-\rho}{(1-\nu\beta)(v_H-v_L)}. \tag{A48}$$

Appendix Figure (A-1) reports graphically the optimal financing choices and the size-flexibility relationship in this version of the model.

No commitment to monitor If the decision to monitor is discretionary ex-post, a lender in an M contract will choose to monitor the loan, if and only if:

$$\left(\nu\tilde{r}_jL_j + (1-\nu)v_LL_j - m\right) \geq v_LL_j, \tag{A49}$$

where as before, $\tilde{r}_j$ is the interest rate renegotiated under Nash bargaining:

$$\tilde{r}_j = v_L + \beta(v_H - v_L). \tag{A50}$$

In Equation (A49), the left-hand side is the expected payoff from monitoring as of $t = 1$, and the right-hand side is the expected payoff from liquidating. Thus the lender only monitors loans such that:

$$L_j \geq \underline{L}_m = \frac{m}{\nu\beta(v_H-v_L)}. \tag{A51}$$

For loans above this threshold, the contract is identical to the case of monitoring with costs paid ex-post described in the Appendix above. For loans below this threshold the contract is the same as an A contract.

The top panel of Appendix Figure (A-2) reports graphically the optimal financing choices in this case. The resulting size-flexibility relationship is described by:

$$g(L) = \begin{cases} 0 & \text{if} \quad L < \overline{L}_M \\ \nu\left(1-\dfrac{1}{2}\left(1+\underline{p}_M(L)\right)\right) & \text{if} \quad L \geq \overline{L}_M \end{cases} \tag{A52}$$

This schedule is upward sloping for $L > \overline{L}_M$ and is reported in the bottom panel of Appendix Figure (A-2).

A.9 The size-flexibility relationship in the data

In order to construct Figure 3, we proceed as follows. First, we proceed separately for SD and SL loans. Consider first the sample of SD loans. In that sample, we start by estimating the following regression:

$$Y_l = \alpha_{m(l)} + \alpha_{s(b(l)),t(l)} + \alpha_{k(l),t(l)} + \varepsilon_l \tag{A53}$$

Here, l indexes a loan and $Y(l)$ is an indicator for whether the loan is modified at least once after origination. Additionally, $\alpha_{m(l)}$ are maturity at origination fixed effects, $\alpha_{s(b(l)),t(l)}$ are borrower sector by origination date ($t(l)$) fixed effects, and $\alpha_{k(l),t(l)}$ are lender by origination date fixed effects. We then retrieve the residuals ε_l.

Next, we construct deciles $j = 1, ..., 10$ of the distribution of loan commitment at origination. Let the values of commitment at origination associated with these deciles be given by $\{d_0, ..., d_{10}\}$, where $d_0 = 0$ and $d_{10} = +\infty$. Let $j(l)$ denote the decile of the loan commitment distribution to which loan l belongs, that is, the unique index $j \geq 1$ such that:

$$d_{j-1} \leq C_l < d_j \tag{A54}$$

where C_l is commitment at origination for loan l. For each loan l, we then construct:

$$\hat{Y}_l = \mu + \varepsilon_l, \tag{A55}$$

where μ is the average modification rate for the entire sample used to estimate specification (A53). For each $j = 1, ..., 10$, we construct:

$$\bar{\hat{Y}}_j = \hat{\mathbb{E}}\left[\, \hat{Y}_l \,|\, j(l) = j \,\right], \tag{A56}$$

where $\hat{\mathbb{E}}\left[\, . \,|\, j(l) = j \,\right]$ denotes the empirical mean for loans belonging to decile j of the commitment distribution. Finally, we construct a scatterplot of the pairs $\left(\tilde{d}_j, \bar{\hat{Y}}_j\right)$, where $\tilde{d}_j = \frac{1}{2}\left(d_{j-1} + d_j\right)$ for $j \leq 9$ and $\tilde{d}_{10} = d_9$.

	$\mathbf{1}\{\text{Modification}\}_{l,t}$		$\mathbf{1}\{\text{Maturity extension}\}_{l,t}$		$\mathbf{1}\{\text{Interest rate change}\}_{l,t}$	
$D^{(-)}_{l,t}$	6.1	6.5	5.3	5.8	1.9	1.8
	(0.28)	(0.36)	(0.24)	(0.34)	(0.16)	(0.19)
$D^{(-)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	2.2	2.7	-3.5	-2.5	5.4	5.7
	(0.52)	(0.67)	(0.32)	(0.46)	(0.46)	(0.62)
$D^{(+)}_{l,t}$	7.5	7.1	6.9	6.3	2.1	2.0
	(0.35)	(0.45)	(0.34)	(0.44)	(0.18)	(0.24)
$D^{(+)}_{l,t} \times \mathbf{1}\{\text{Syndication}\}_l$	-0.19	-0.1	-2.4	-1.6	3.0	2.4
	(0.48)	(0.67)	(0.40)	(0.50)	(0.41)	(0.53)
mean rate	15.0%	14.9%	7.2%	6.8%	9.3%	9.5%
lender × quarter f.e.	✓	✓	✓	✓	✓	✓
sector × quarter f.e.	✓	✓	✓	✓	✓	✓
maturity at orig. f.e.	✓	✓	✓	✓	✓	✓
loan f.e.	✓	✓	✓	✓	✓	✓
borrower controls	✓	✓	✓	✓	✓	✓
# S&P rating categories	21	3	21	3	21	3
# obs	2467k	2467k	2467k	2467k	2467k	2467k
# loans	266k	266k	266k	266k	266k	266k
# borrowers	86k	86k	86k	86k	86k	86k

Table A-1: Financial distress and loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (2). For each of the three outcome variables, we consider specifications for 1) rating changes across the 21 S&P rating categories and 2) rating changes across a smaller set of 3 main rating category changes (investment-grade, non-investment-grade, junk). The variable $D^{(-)}_{l,t}$ is a indicator that is equal to 1 if the relevant loan rating of the loan declines between quarters $t-1$ and t. The line "mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. In the first two columns, a modification is defined as either a maturity extension, or a change in interest rates. Section 2 and Appendix A.1 provide more details on the definition of variables, on the classification of loans between single-lender and syndicated, and on summary statistics in the regression sample.

	mean	s.d.	p5	median	p95	Nr. of entities
Panel A: Loan-level						
Initial maturity (qtrs.)	21.1	21.1	3.0	20.0	57.0	391k
Maturity remaining (qtrs.)	16.6	19.6	1.5	13.5	44.7	391k
Interest rate spread (bps.)	168	134	0	175	396	391k
Loan/asset ratio	0.383	1.458	0.003	0.051	1.194	305k
$\mathbf{1}\{\text{Syndication}\}$	26.4	44.1	0	0	100	391k
$\mathbf{1}\{\text{Line}\}$	39.9	49.0	0	0	100	391k
$\mathbf{1}\{\text{Fixed-rate}\}$	31.2	45.5	0	0	100	391k
$\mathbf{1}\{\text{Secured}\}$	85.8	33.7	0	100	100	391k
Panel B: Borrower-level (all borrowers)						
Initial maturity (qtrs.)	24.9	25.1	4.0	20.0	80.0	155k
Maturity remaining (qtrs.)	19.8	23.3	1.9	13.5	70.5	155k
Interest rate spread (bps.)	176	125	0	185	376	155k
Loan/asset ratio	0.640	1.805	0.009	0.189	2.356	101k
$\mathbf{1}\{\text{Syndication}\}$	9.0	27.2	0	0	100	155k
$\mathbf{1}\{\text{Line}\}$	38.2	44.4	0	0	100	155k
$\mathbf{1}\{\text{Fixed-rate}\}$	35.0	44.5	0	0	100	155k
$\mathbf{1}\{\text{Secured}\}$	92.3	23.9	0	100	100	155k
Panel C: Borrower-level (public borrowers)						
Initial maturity (qtrs.)	17.1	6.3	4.0	18.2	25.4	3k
Maturity remaining (qtrs.)	19.8	23.2	3.0	13.0	19.2.5	3k
Interest rate spread (bps.)	147	107	0	137	331	3k
Loan/asset ratio	0.172	0.746	0.001	0.018	0.789	3k
$\mathbf{1}\{\text{Syndication}\}$	63.2	39.5	0	81.7	100	3k
$\mathbf{1}\{\text{Line}\}$	68.9	31.4	0	75.0	100	3k
$\mathbf{1}\{\text{Fixed-rate}\}$	14.3	25.5	0	1.4	84.6	3k
$\mathbf{1}\{\text{Secured}\}$	70.4	37.0	0	91.0	100	3k

Table A-2: Additional summary statistics at the loan-by-quarter level. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. Panel A reports summary statistics on the distribution of loan characteristics across all loan-by-quarter observations. In this case, the column marked "Nr. of entities" is the total number of loans in the sample. Panel B reports the summary statistics on the same variables, after taking a weighted average of outstanding loans at a point in time within each borrower, where the weights are committed exposures. In this case, the column marked "Nr. of entities" is the number of borrowers. Panel C reports the same summary statistics restricted to the sample of borrowers that can be matched to Compustat.

Panel A.	SNC sample ∩ Y14				SNC sample			
	p25	p50	p75	mean	p25	p50	p75	mean
Loan size ($ mn)	16.5	44.0	120.6	95.3	75.0	200	500.0	489.7
Facilities per loan (#)	1	2	3	2	4	8	16	54.2
Mat. at orig. (quart.)	16	20	20	18	15	20	20	22.8
# participants	31,472				24,730			
# loans	14,603				29,693			
# facilities	38,122				1,609,887			
% term loans	32				–			
% fixed rate	6				–			
% public	50				–			

Panel B.	SNC cov. sample ∩ Y14				SNC cov. sample			
	p25	p50	p75	mean	p25	p50	p75	mean
Loan size ($ mn)	13.3	36.0	98.0	80.5	75	200	500	439.5
Facilities per loan (#)	1	2	3	2	5	9	27	84.7
Mat. at orig. (quart.)	18	20	20	19	20	20	24	20.6
# participants	10,653				19,384			
# loans	4,928				8,802			
# facilities	13,605				745,892			
% term loans	34				–			
% fixed rate	7				–			
% public	47				–			

Table A-3: Summary statistics for the FR Y-14Q merged with the full SNC sample (Panel A) and the SNC covenant review sample (Panel B). The first group of columns reports summary statistics at origination for loans that are covered both in the SNC sample and in the FR Y-14Q sample. The second group of columns reports the same summary statistics at origination for the full SNC sample. The FR Y-14Q as well as the SNC sample contain loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the FR Y-14Q sample.

	$\mathbf{1}\{\text{At least one interest rate change}\}_l$				
$\mathbf{1}\left\{\begin{array}{c}\text{Performance}\\\text{pricing}\end{array}\right\}_l$	-10.91	-9.56	-10.94	-11.90	4.11
	(1.179)	(1.187)	(1.148)	(1.210)	(1.763)
lender f.e.	✓	✗	✗	✗	✗
sector f.e.	✗	✓	✗	✗	✗
maturity at orig. f.e.	✗	✗	✓	✗	✗
orig. date f.e.	✗	✗	✗	✓	✗
borrower f.e.	✗	✗	✗	✗	✓
# loans	7958	7896	7949	7958	6317

Table A-4: Performance pricing and loan modifications: comparison of conditional means. This table computes the probability of a loan experiencing at least one interest rate change, conditional on having performance pricing clauses, in the sample of Y14 syndicated (SD) loans successfully merged to Dealscan, and corresponding to the group of loans described in Panel A of Table 7. The FR Y-14Q sample contains syndicated loans originated after 2012:Q3 and active up to and including 2023:Q3. Each specification control for a different fixed effect (lender, sector, maturity at origination, origination date, borrower). The coefficient reported is the loading on an indicator for whether the loan features a performance pricing clause in the Dealscan data.

Panel A.	Initial terms		Modifications at re-origination				
	All loans	Re-originated loans	% modif.	% incr.	mean incr.	% decr.	mean decr.
Interest rate (p.p.)							
All loans	1.67	1.71	13	7.2	0.66	6	−0.73
Single-lender	1.58	1.57	14	7.8	0.63	6	−0.83
Syndications	1.89	2.01	12	5.9	0.73	6	−0.51
Maturity (y)							
All loans	5.50	3.85	52	50.5	1.89	2	−2.65
Single-lender	5.87	3.66	54	52.2	1.74	2	−3.11
Syndications	4.52	4.26	49	47.0	2.25	2	−1.59

Panel B.	Initial terms		Modifications at renewal				
	All loans	Renewed loans	% modif.	% incr.	mean incr.	% decr.	mean decr.
Interest rate (p.p.)							
All loans	1.67	1.64	10	5.7	0.72	4	−0.7
Single-lender	1.58	1.52	10	5.8	0.75	4	−0.77
Syndications	1.89	1.93	10	5.5	0.62	4	−0.53
Maturity (y)							
All loans	5.50	4.89	52	50.8	1.57	1	−2.61
Single-lender	5.87	4.71	55	53.8	1.42	1	−2.98
Syndications	4.52	5.31	45	43.4	2.03	1	−1.61

Table A-5: Revisions of credit agreements: summary statistics. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan level in both panels. In Panel A, Columns 2 and 3 tabulate the average spread and maturity at origination for all loans, and for those that are re-originated at some point, respectively. Columns 4, 6, and 8 tabulate the percentage of loans that undergo a modification when re-originated and the direction (increase or decrease) of either a change in interest rate spreads or maturity. Columns 5 and 7 detail the average size of a change in a spread or maturity at re-origination. Panel B repeats this exercise for loan renewals.

	$\mathbf{1}\{\text{Renewal}\}_{l,t}$		
$\mathbf{1}\{\text{Syndication}\}_{l}$	-0.4	-1.8	-1.3
	(0.13)	(0.10)	(0.15)
Mean rate	3.4%	3.6%	2.9%
lender × quarter f.e.	✗	✓	✓
sector × quarter f.e.	✗	✓	✓
borrower × quarter f.e.	✗	✗	✓
loan controls	✗	✓	✓
borrower controls	✗	✓	✗
borrowers with SL and SD loans	✗	✗	✓
# obs	2639k	1683k	662k
# loans	289k	208k	84k
# borrowers	120k	68k	5k

Table A-6: Syndication status and loan renewals. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. We use the data at the loan-quarter level, and the specifications we estimate are summarized in Equation (1). The line "Mean rate" indicates the unconditional average of the independent variable in the regression sample corresponding to each specification. Standard errors are reported in parentheses and double clustered at the borrower and quarter levels. We consider specifications with no independent variables other than syndication status, a saturated specification, and one restricted to firms that have at least one single-lender and one syndicated loan. The loan-level controls are: an indicator for whether the loan is a credit line; an indicator for whether the loan is secured; indicator for whether the loan is fixed-rate; a set of maturity at origination fixed effects. The borrower-level controls are: the debt-to-asset ratio; the net income to assets ratio; the ratio of current to total assets. Section 2 and Appendix A.1 provide more details on the definition of variables in terms of underlying data items, on sample selection, and on the classification of loans between single-lender and syndicated. Additionally, Appendix Table A-2 contains summary statistics for the regression sample.

		# obs.	# loans	# borrowers	# banks
1	Drop observations with `date` after 2022:Q1	14,742,517	1,430,192	470,017	43
2	Drop if originated after 2022:Q1, matured before 2011:Q3, or a foreign firm	11,840,527	1,143,060	376,201	42
3	Drop banks that are acquired	11,411,469	1,104,197	368,800	39
4	Drop banks with $<$ 100 loans per quarter	11,224,597	1,079,422	361,166	32
5	Drop loans observed for only one quarter, obs. before 2012:Q3	11,150,498	1,005,323	345,264	32
6	Drop NAICS-2 industries FIRE, Construction, Utilities; loans in a SPV	7,092,289	621,075	239,493	31
7	Drop loans not continuously observed	6,652,795	592,134	230,032	31
8	Drop loans where `interestrate`, `committed`, `originationdate`, `spread`, or `utilized` is missing for all observations	6,543,462	573,957	225,333	30
9	Drop loans with negative `interestrate`, `committed`, `utilized` or missing `securitytype`	6,421,666	565,120	223,174	30
10	Drop loans with a decreasing `originationdate`	6,344,022	560,896	222,059	30
11	Drop loans observed after maturity	6,303,288	557,546	220,816	30
12	Drop firms with `totalssetscurrent`, `netsalescurrent`$<$ 0	6,127,881	547,703	218,597	30
13	Drop loans that never exit the syndication pipeline	5,937,918	529,709	214,172	30
14	Drop loans where initial maturity is always missing	5,294,362	482,716	192,291	30
15	Drop loans originated before 2012:Q1	3,926,960	390,572	155,304	30

Table A-7: Sample selection steps. The third column reports the number of observations before the drop step described in each line. The fourth, fifth and sixth columns report, respectively, the remaining number of unique loans, borrowers, and banks in the sample.

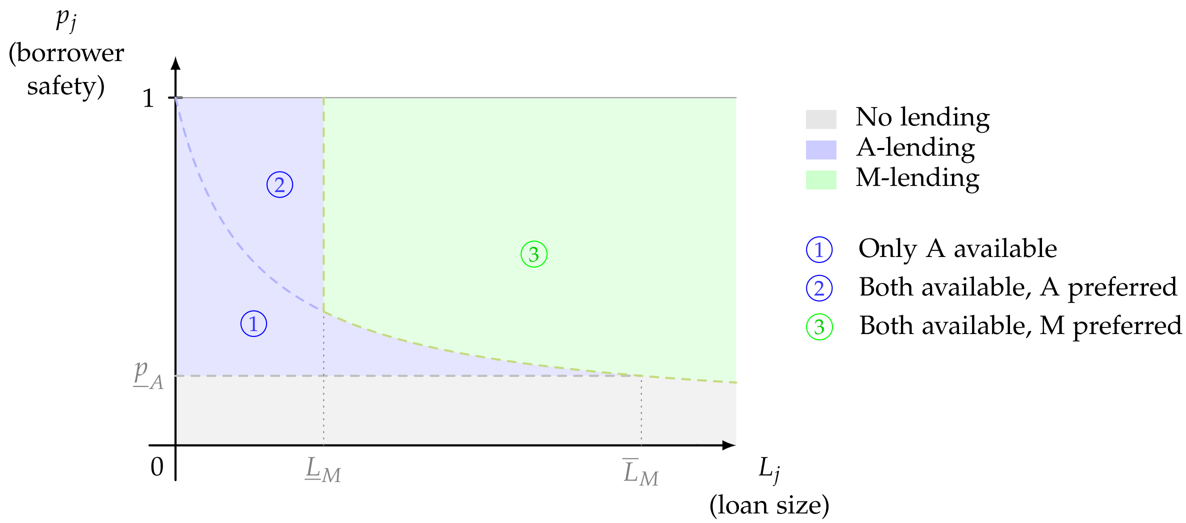
	# borrowers	# loans	% not modif.	% modified		
				before bankruptcy	during bankruptcy	after bankruptcy
All loans	147k	359k	58%			
Matched to bankruptcy data	1k	22k	61%	12%	14%	14%
All loans						
Single-lender	135k	271k	63%			
Syndication	12k	88k	43%			
Matched to bankruptcy data						
Single-lender	1k	10k	72%	9%	10%	9%
Syndication	0k	12k	51%	15%	16%	18%

Table A-8: Modification rates for all borrowers, and for those that enter bankruptcy and match to a loan in our sample of the FR Y-14Q dataset. 33,647 borrowers have non-missing assets in the bankruptcy data; of these, 1503 can be matched to borrowers in the FR Y-14Q. The FR Y-14Q sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the FR Y-14Q sample. Modification rates are expressed as a fraction of all loans outstanding for each group of borrowers.

	# loans	# obs	% distressed	Modification		Mat. extension		IR change	
				% distr.	% not distr.	% distr.	% not distr.	% distr.	% not distr.
All loans	391k	3,927k	3.56%	1.71%	11.47%	1.00%	5.21%	1.05%	6.90%
Single-lender	287k	2,920k	3.64%	1.50%	9.17%	1.11%	6.00%	0.70%	3.80%
Syndications	103k	1,007k	3.33%	2.31%	18.15%	0.67%	2.92%	2.07%	15.88%

Table A-9: The relationship between ratings downgrades and financial distress. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. Financial distress is defined as a deterioration in a loan's internal credit rating of by 1 on a scale of 1 to 10. The fractions reported under "Modification", "Mat. extension", and "IR change" add up to the total fraction of loan-quarter observations that are modified, received a maturity extension, or experienced a change in interest rates. A modification is defined as either a maturity extension or a change in interest rates.

A. Optimal financing choices



B. The size-flexibility relationship

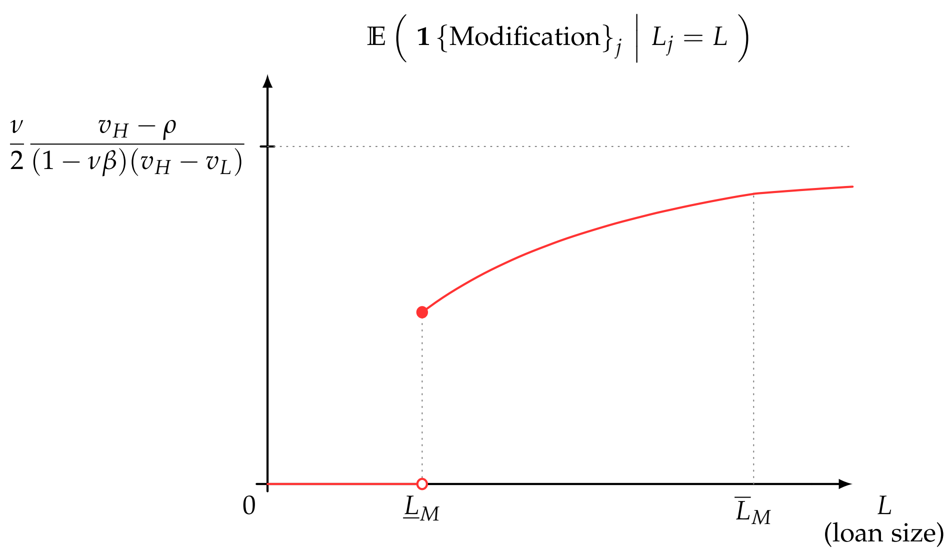
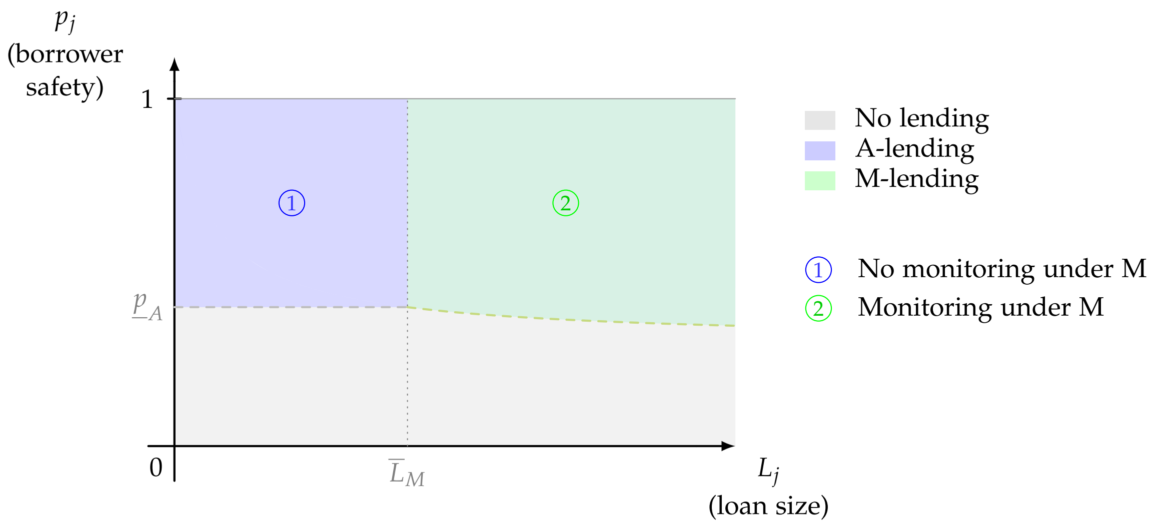


Figure Caption A-1: Optimal financing choices in the model of Appendix (A.8.2), when the lender can commit to monitor ex-post, and their implications. Panel A shows the optimal choice of M versus A contracts, as a function of observable borrower characteristics (L_j, p_j). In the grey shaded region, no lending contracts are available; in the blue shaded regions, borrowers choose A-lending contracts; in the green shaded region, borrowers choose M-lending contracts. The threshold $\underline{p}_A$ is defining Equation (13), while the thresholds $\underline{L}_M$ and $\overline{L}_M$ are defined in Appendix A.8.2. Panel B shows the probability of loan modification as a function of loan size L_j, assuming a uniform distribution over types p_j.

Alt text: The top panel shows the regions by type of lending. The x-axis is loan size and ranges from 0 to L and the y-axis is p_j which is borrow safety and ranges from 0 to 1. There is a square for values below y-value $\underline{P}_A$ where there is no lending. Above this line there are three regions 1) from x-value 0 to $\overline{L}_M$ where A-lending is only available with a vertical line that slopes up from $\underline{P}_A$ toward 1, 2) to the left of $\underline{L}_M$ and well above $\underline{P}_A$ where both A and M lending are available, but A is preferred, and 3) a region to the right of $\underline{L}_M$ where M is preferred. The bottom panel shows the relationship between size and flexibility. The x-axis is loan size and ranges from 0 to L and the y-axis is the probability of modification ranging from 0 to $(\nu/2) * (v_h - \rho)/(2 * (1 - \nu\beta) * (v_h - v_l)$. There is a line plotted that has y-value 0 from 0 to $\underline{L}_M$ and then jumps up at $\underline{L}_M$ and slopes upward to $\overline{L}_M$ where it gently approaches the limit of the y-axis.

A. Optimal financing choices



B. The size-flexibility relationship

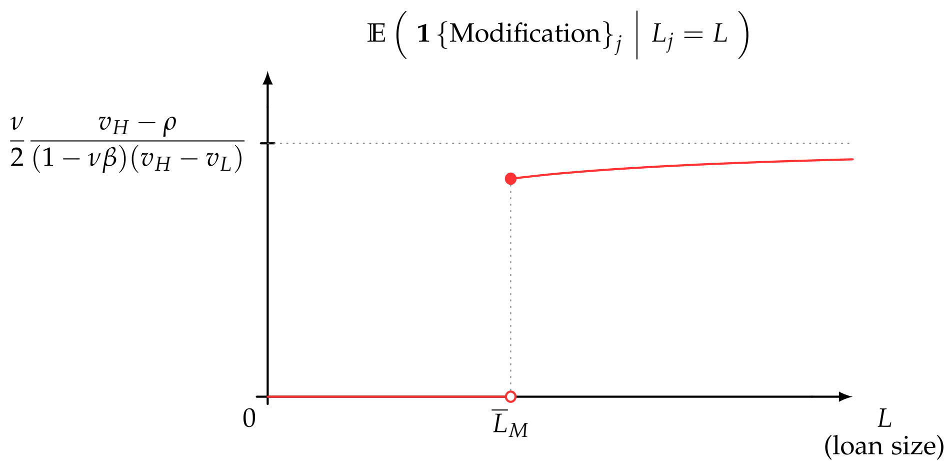


Figure Caption A-2: Optimal financing choices in the model of Appendix (A.8.2), when the lender cannot commit to monitor ex-post, and their implications. Panel A shows the optimal choice of M versus A contracts, as a function of observable borrower characteristics (L_j, p_j). In the grey shaded region, no lending contracts are available; in the blue shaded regions, borrowers choose A-lending contracts; in the green shaded region, borrowers choose M-lending contracts. The threshold $\underline{p}_A$ is defining Equation (13), while the threshold $\overline{L}_M$ is defined in Appendix A.8.2. Panel B shows the probability of loan modification as a function of loan size L_j, assuming a uniform distribution over types p_j.

Alt text: The top panel shows the regions by type of lending. The x-axis is loan size and ranges from 0 to L and the y-axis is p_j which is borrow safety and ranges from 0 to 1. There is a square for values below y-value $\underline{P}_A$ where there is no lending. Above this line there are three regions 1) from x-value 0 to $\overline{L}_M$ where A-lending is only available with a vertical line at $\underline{P}_A$ at $\overline{L}_M$ and there is no monitoring and 2) a region to the right of $\overline{L}_M$ where M is preferred and there is monitoring The bottom panel shows the relationship between size and flexibility. The x-axis is loan size and ranges from 0 to L and the y-axis is the probability of modification ranging from 0 to $(\nu/2) * (v_h - \rho)/(2 * (1 - \nu\beta) * (v_h - v_l)$. There is a line plotted that has y-value 0 from 0 to $\underline{L}_M$ and then jumps up at $\underline{L}_M$ and slopes upward to $\overline{L}_M$ where it gently approaches the limit of the y-axis.

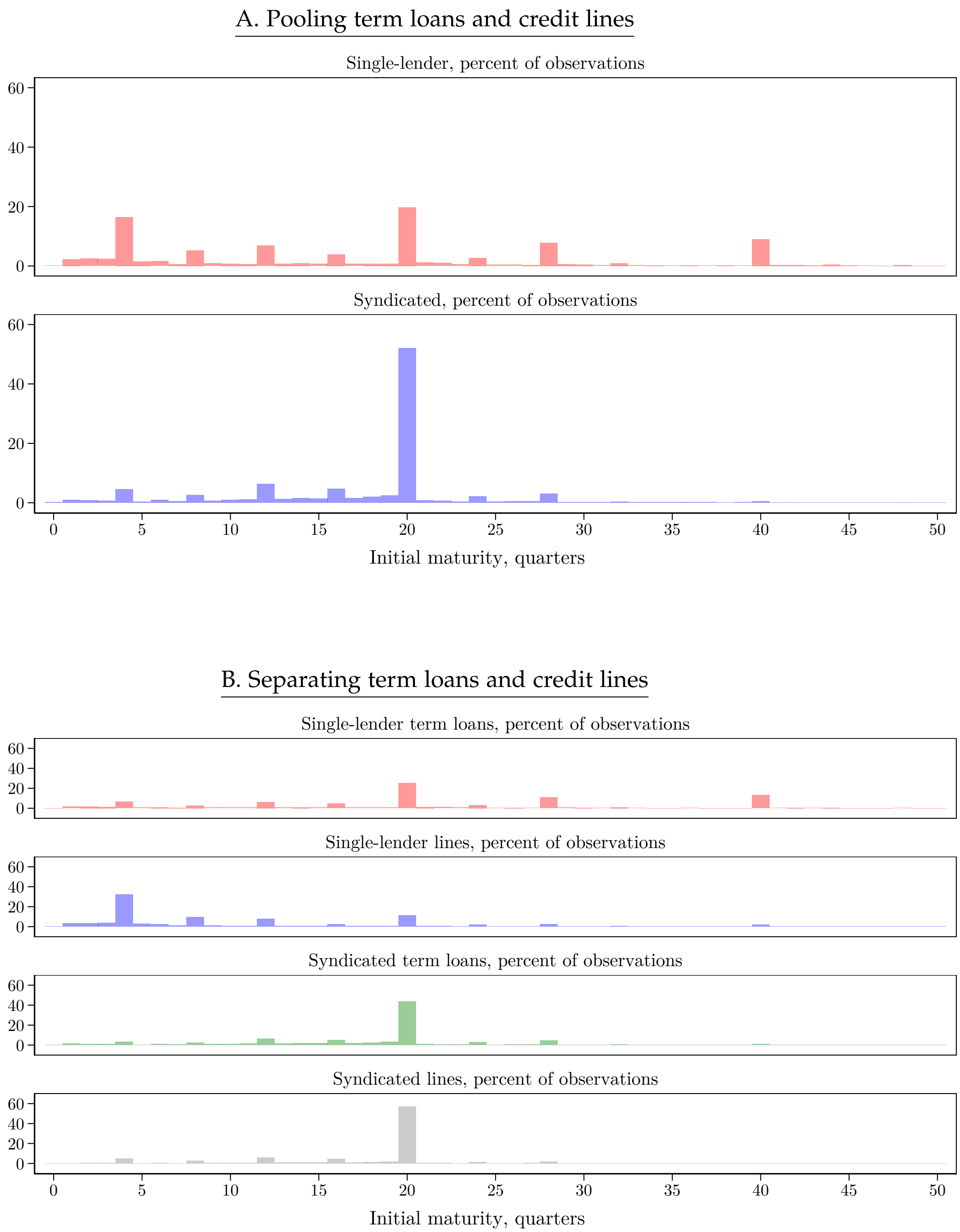
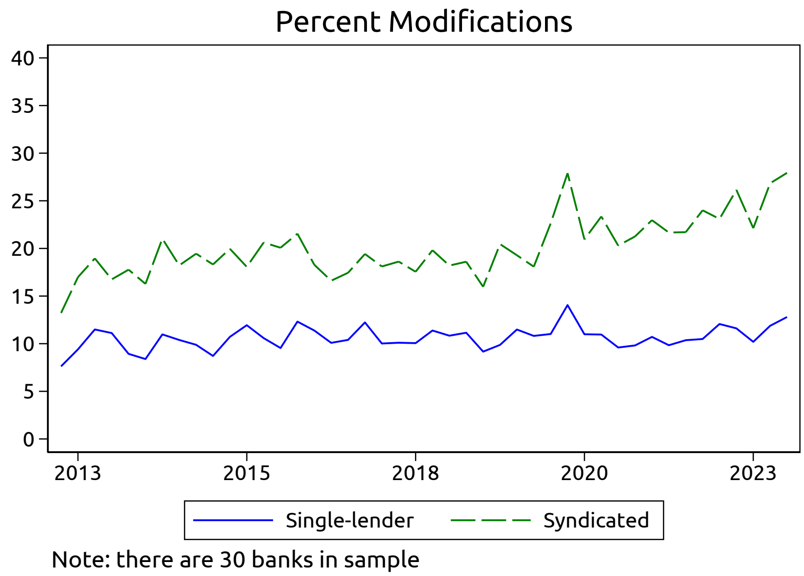


Figure Caption A-3: The distribution of maturity at origination. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. In both panels, maturities on the horizontal axis are expressed in quarters. Panel A shows the distribution of maturity at originations for all loans in our final sample, distinguishing between SL loans (red) and SD loans (blue). Panel B also shows the distribution of maturity at origination for each loan group, but separates term loans from credit lines.

Alt text: The figure shows how the distributions of single-lender and syndicated loans differ. The x-axis on both panels is the initial maturity in quarters and it ranges from 0 to 51. The top panel plots the distribution of single-lender and syndicated loans. The distribution of single-lender loans has prominent spikes at 5, 20, and 40 quarters to 20, 20, and 10 percent of the sample, respectively. By contrast, the distribution of syndicated loans has only on prominent spike and it's at 20 quarters to 50 percent, respectively. The bottom panel plots the distribution of single-lender term loans, single-lender line loans, syndicated term loans, and single-lender line loans. The distribution for single-lender term loans has spikes around 4, 20, 28, and 40 quarters. The distribution for single-lender lines has a spike around 4 quarters. By contrast, the distribution for either syndicated term or line loans each have a prominent spike around 20 quarters.

A. Pooling term loans and credit lines



B. Term loans only

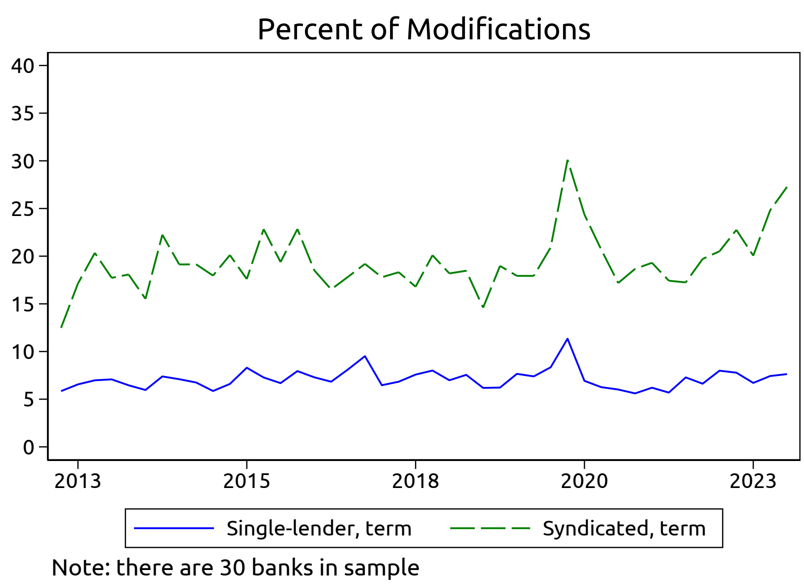


Figure Caption A-4: Time series of modification rates. The top panel reports quarterly modification rates from the sample of loan-quarter observations. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. A loan is flagged as modified in quarter t if it experiences a change in either interest rate (or interest rate spread, for floating rate loans), or a change in maturity date, from quarter t to quarter $t-1$. The bottom panel reports modification rates in the subsample of term loans only.

Alt text: The figure shows modification rates for all single-lender and syndicated loans (top panel) and just single-lender and syndicated term loans (bottom panel) from 2012:Q3 to 2023:Q3. The y-axis ranges from 0 to 40 percent on both panels. The top panel plots the series for single-lender loans is around 10 percent and largely flat for the sample. The series for syndicated loans is around 18 percent and jumps to almost 30 percent in 2020:Q2. The bottom panel is similar to the top panel. The series for the single-lender term loans is flat and around 6 percent. For syndicated term loans, the series is flat and around 18 percent except for a spike to about 30 percent in 2020:Q2.

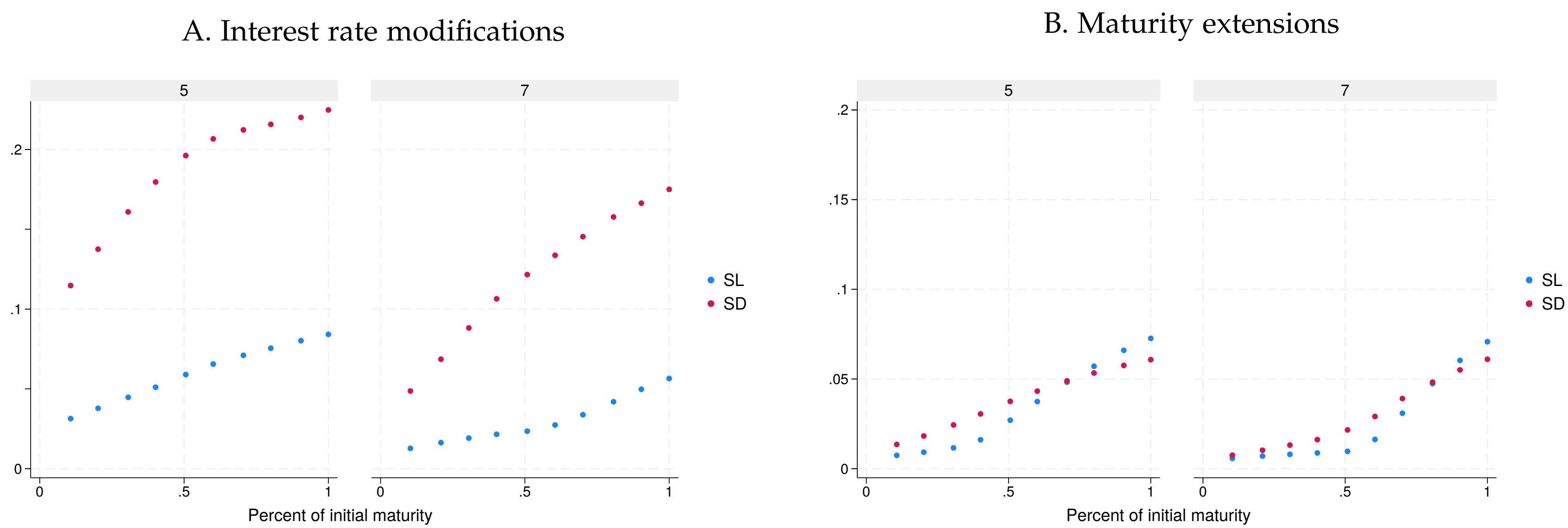
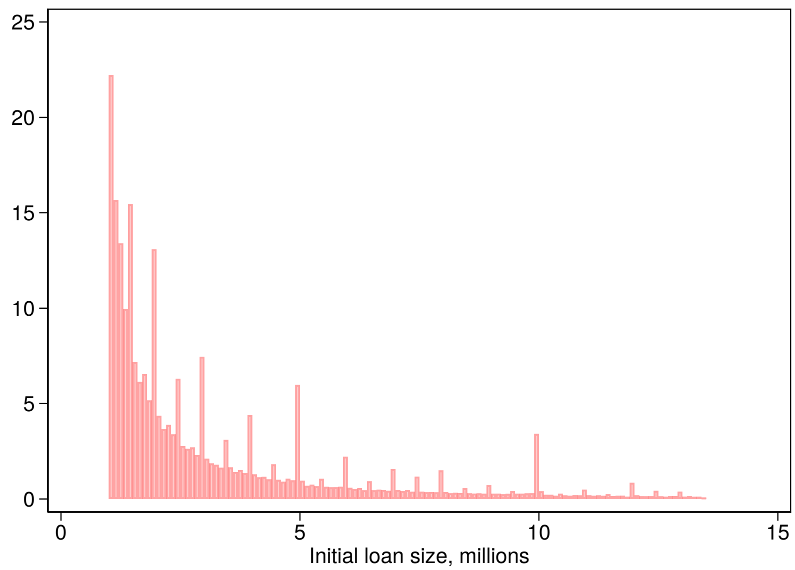


Figure Caption A-5: The timing of loan modifications. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. Panel A shows interest rate changes, and Panel B shows maturity extensions. Each subpanel focuses on loans with different maturities at origination, with the number of years at origination indicated in the title of the subpanel. In each subpanel, the horizontal axis is time expressed elapsed since origination expressed as a fraction of the original maturity at origination. On the vertical axis, we report an estimate of the hazard rate of each event (interest rate change or maturity extension) using the Nelson-Aalen estimator of the hazard function. The red diamonds correspond to syndicated (SD) loans and the blue dots correspond to single-lender (SL) loans.
Alt text: The figure shows hazard rates for interest rate modifications (panel A) and maturity extensions (panel B) Each panel has two subpanels for 5 and 7 year maturities with two lines each for single-lender and syndicated loans. On the interest rate modification panel, the x-axis ranges from 0 to 1 and is the percent of initial maturity and the y-axis from 0 to 0.25.The hazard rates are upward sloping for both panels and that for syndicated loans is always above that for single lender loans. The hazard rates do not overlap. On the maturity extension panel, the x-axis ranges from 0 to 1 and is the percent of initial maturity and the y-axis from 0.0 to 0.2. For the 5-year maturity, the lines are upward sloping and that for single-lender loans is below that of syndicated loans until about 3/4 of the life of the loan is left. For the 7-year maturity, the hazard rates overlap and are upward sloping.

A. Single-lender (SL) loans, frequency in thousands



B. Syndicated (SD) loans, frequency in thousands

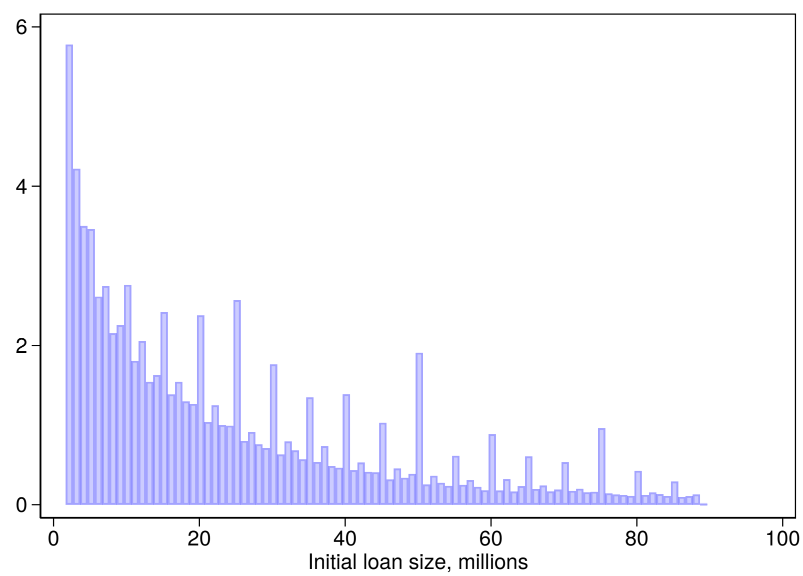


Figure Caption A-6: The distribution of committed exposure (loan size) at origination. The sample contains loans originated after 2012:Q3 and active up to and including 2023:Q3. There are 30 banks in the sample. In both panels, commitments on the horizontal axis are expressed in millions of dollars. Panel A shows the distribution for single-lenders (SL) loans, and Panel B shows the distribution for syndicated (SD) loans, truncated at the 90th percentile to facilitate presentation.

Alt text: The figure plots the distribution of initial loan size excluding the top decile for single-lender and syndicated loans in the top and bottom panels, respectively. The For single-lender loans in the top panel, the x-axis ranges from $0 to $15 million and the y-axis from 0 to 25 thousand. There are about 22,000 loans with an initial maturity of 1 million and the distribution gently slopes downward with spikes of 7,000 and 4,000 at $5 and $10 million, respectively. For syndicated loans in the bottom panel, the x-axis ranges from $0 to $90 million and the y-axis from 0 to 6 thousand. There are about 6,000 loans with an initial maturity of $1 million and the distribution gently slopes downward to about $50 at $90 million in initial maturity.

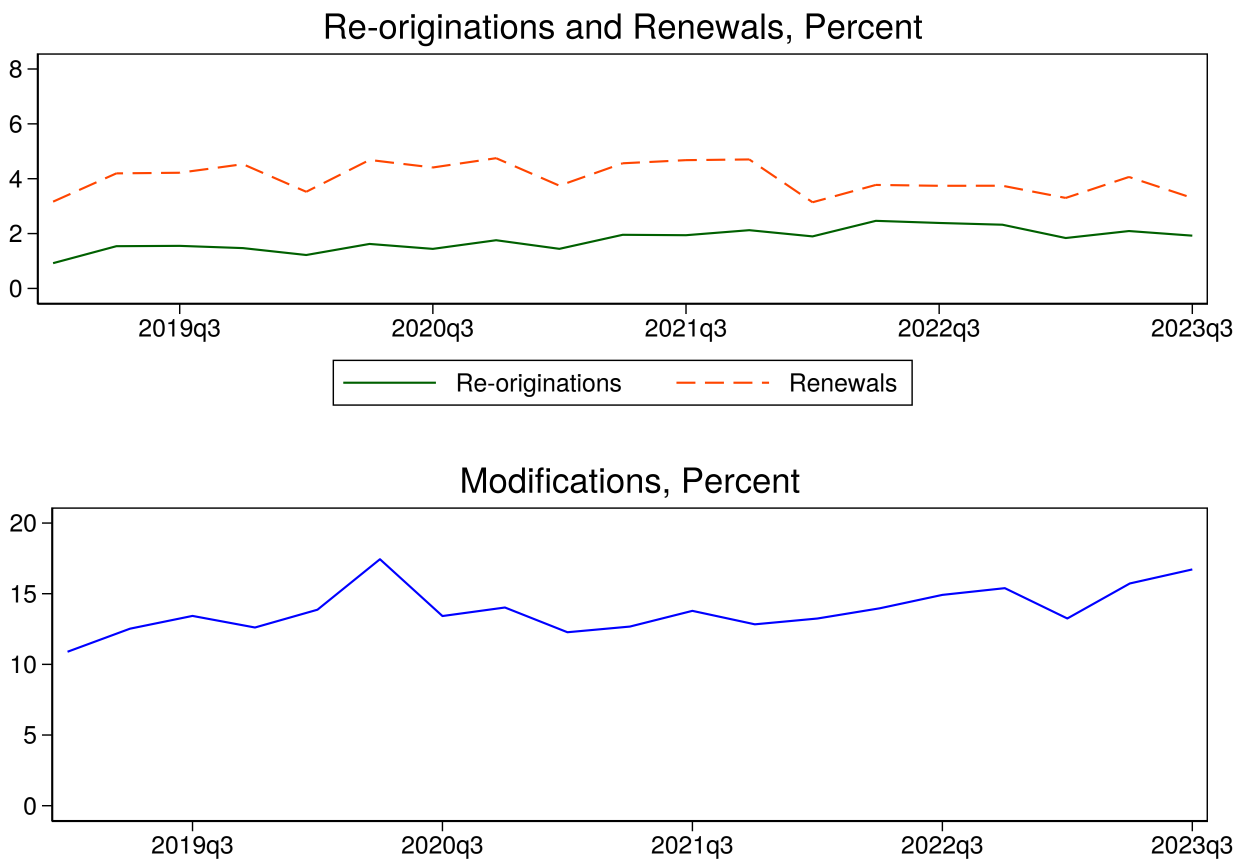


Figure Caption A-7: Time series of re-origination and renewal rates (top panel) and modification rates (bottom) panel during the 2019:Q1-2023:Q3 period. The bottom panel reports the same data as Appendix Figure A-4, but focuses on the COVID period. A loan is flagged as modified in quarter t if it experiences a change in either interest rate (or interest rate spread, for floating rate loans), or a change in maturity date, from quarter t to quarter $t-1$. The top panel reports the time series for renewals and re-origination over the same period. For a definition of renewals and re-originations, see Section 4.1.3.

Alt text: The figure shows re-origination and renewal rates (top panel) and modification rates (bottom panel) from 2019:Q1 to 2023:Q3. The y-axis of the top panel ranges from 0 to 8 percent and plots two series. The series for re-originations is flat over the period shown and just below 2 percent. The series for renewals is slightly higher around 4 percent and mostly flat expect for slight dips in the first quarter of each year. The y-axis of the bottom panel ranges from 0 to 20 percent and has a series for modifications which is around 12 percent except for a bump up to 16 percent in 2020:Q2.

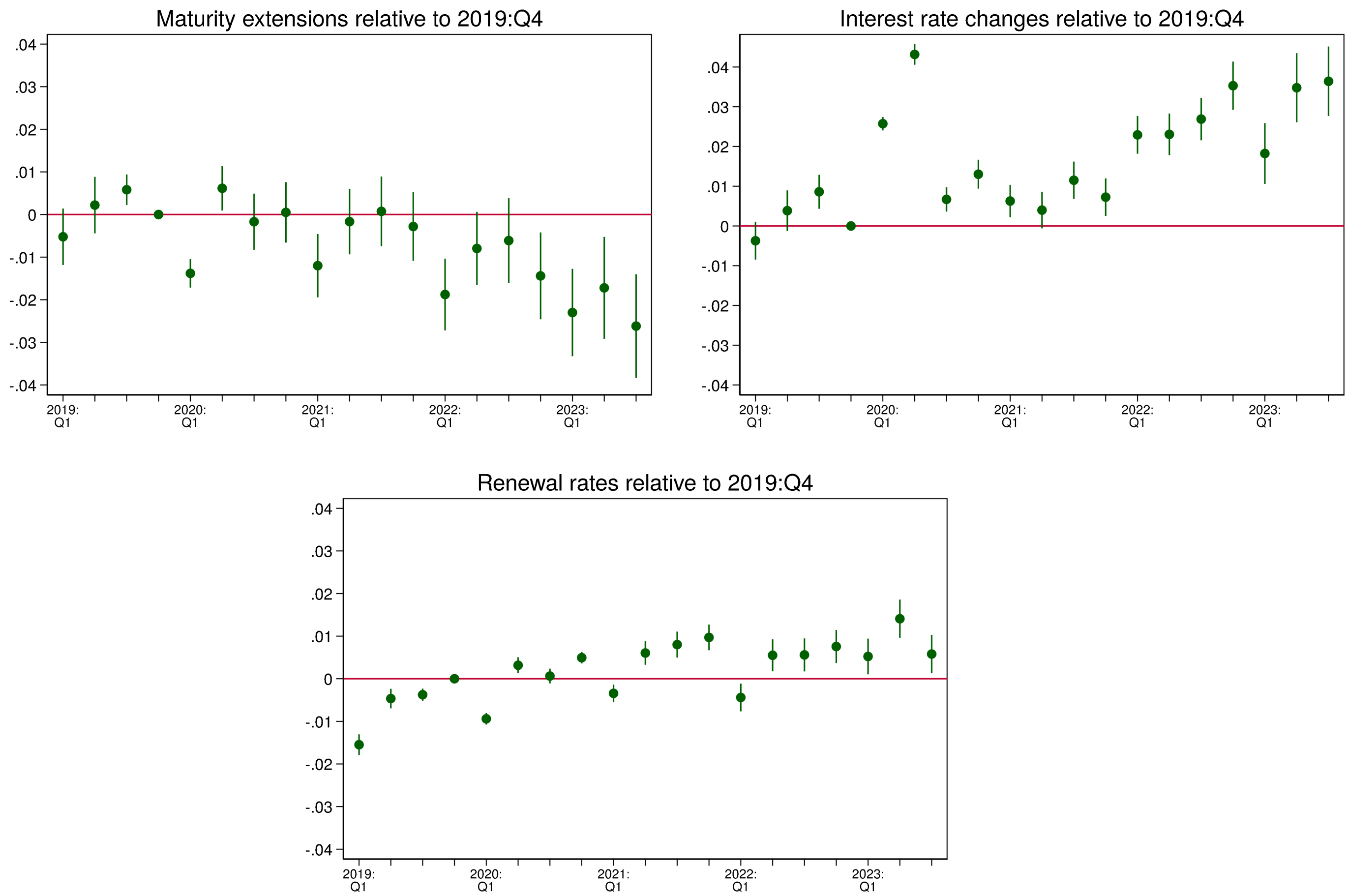


Figure Caption A-8: Time effects in Equation (A1): $Y_{i,t} = \gamma_{m,j,b} + \delta_t + \varepsilon_{i,m,j,b,t}$ for loan i, in quarter t, with maturity at origination m, lender j, borrower b, and sector s. In the top panel, the dependent variable is an indicator for whether the loan experiences a maturity extension in quarter t. In the middle panel, the dependent variable is an indicator for whether the loan experiences a change in interest rate (or interest rate spread, for floating rate loans) in quarter t. In the bottom panel, the dependent variable is an indicator for whether the loan experiences a renewal of the credit agreement in quarter t.

Alt text: The figure plots the regression results from specification A1. The top panel shows the point estimates of time-dummy coefficients for maturity extensions from 2019 to 2023:Q3 with the coefficient for 2019:Q4 set to zero. The y-axis ranges from -0.04 to 0.04. Except for 2019:Q3, the quarters before 2020 have coefficients that are not statistically significant from 2019:Q4. From 2020 to 2022, only the first quarter has a coefficient that is statistically significant from 2019:Q4. Thereafter, the coefficients are statistically significant and negative. In the middle panel, the y-axis ranges from -0.04 to 0.05 and the panel shows the point estimates of the time-dummy coefficients for spread modifications from 2019 to 2023:Q3 with the coefficient for 2019:Q4 set to zero. Except for 2019:Q3, the quarters before 2020 have coefficients that are not statistically significant from 2019:Q4. In 2020 through the end of the period shown, all of the coefficients are positive and most are statistically significant from zero. In the bottom panel, the y-axis ranges from -0.04 to 0.04 and the panel shows the point estimates of the time-dummy coefficients for renewal rates from 2019 to 2023:Q3 with the coefficient for 2019:Q4 set to zero. In 2019, the coefficients are negative and statistically significant. From 2020 to the end of the period shown, the coefficient are mostly positive and mostly significant.

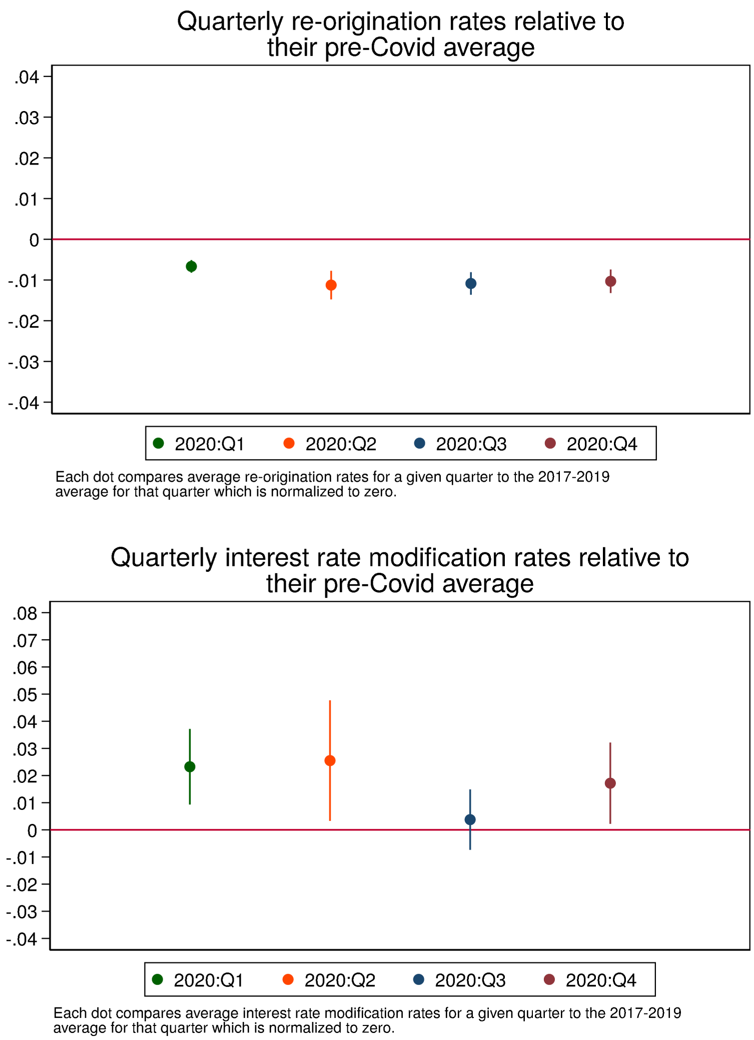


Figure Caption A-9: Quarter fixed effects in Equation (A2). This specification compares re-origination rates (top panel) and the rates of changes in interest rates (or interest rate spreads, for floating rate loans) (bottom panel) in 2020:Q1 through 2020:Q4, to the corresponding modification rates in the same calendar quarters in 2017, 2018, and 2019, additionally controlling for borrower, lender, and maturity at origination fixed effects; see Appendix A.3 for more details.

Alt text: The figure plots the regression results for specification A2. The panels show the point estimates for each quarter in 2020 relative to the quarterly averages for each quarter from 2017 to 2019. The top panel has a y-axis that ranges from -0.04 to 0.04 and plots quarterly re-origination rates. All four of the quarterly re-origination rates are below their pre-2020 averages. The bottom panel has a y-axis that ranges from 0.04 to 0.08 and plots the quarterly interest rate modification rates. The point estimates for the first and second quarters are above their pre-2020 averages.